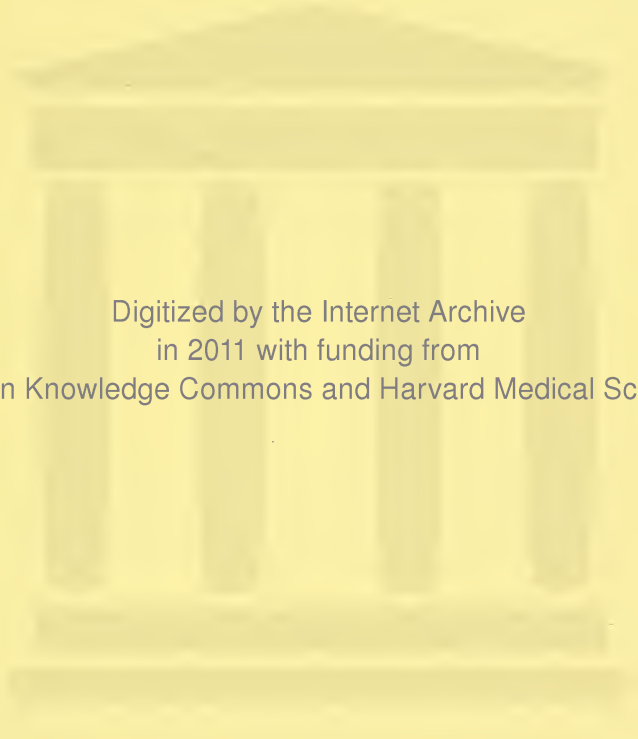

FOOD,

AND ITS

INFLUENCE

ON

HEALTH AND DISEASE;

OR,

AN ACCOUNT OF THE EFFECTS OF DIFFERENT KINDS OF ALIMENT ON THE HUMAN BODY.

WITH

DIETETIC RULES FOR THE PRESERVATION OF THE HEALTH.

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TO ANTHONY WHITE, Esq.,

PRESIDENT OF THE ROYAL COLLEGE OF SURGEONS IN LONDON,
SURGEON TO THE WESTMINSTER HOSPITAL, &c. &c. &c.,

THE FOLLOWING PAGES ARE WITH GREAT PLEASURE

INSCRIBED,

AS A MARK OF ESTEEM,

FOR HIGH PROFESSIONAL AND PRIVATE CHARACTER,

BY HIS FRIEND,

THE AUTHOR.

PREFACE.

A GREAT number of the diseases with which the human race is afflicted may be ascribed either to a paucity or to a superabundance of food. In the former case, the organs of the body are unable to obtain a sufficiency of materials adapted for their preservation in a state of vigour; and in the latter, disease is produced, either because wholesome food is taken in too large quantities, or from the inconsiderate introduction into the system of many articles of diet which interfere with nutrition. The object of the following pages is not to indicate the manner in which a greater abundance of alimentary matter is to be procured, but to point out the importance of dietetic plans to those who, though fortunate enough to possess the means of obtaining everything requisite for the full development of all parts of the

body, find themselves, either from the use of improper food or from a perseverance in habits of living calculated to depress the vital powers, surrounded with all earthly blessings except good health. No country in Europe contains so many people in this state as our own, and it is to them particularly that the following pages are addressed, for the purpose of showing what extensive alterations can be produced in the body, merely by the adoption of different plans for its nutrition, which not only have the effect of tending to preserve the health, but also constitute some of the most effectual means that are known for preventing and eradicating disease.

MATTHEW TRUMAN, M.D.

18, *Bolton Street, Piccadilly,*
August, 1842.

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FOOD.

INTRODUCTION.

The care usually taken of the health extends very little beyond trying to protect the body from injury by actual violence; for people in general are exceedingly negligent about adopting plans to prevent derangement of the system. The majority of diseases result from circumstances which interfere with the nutritive processes; and this is not extraordinary, when the extensive influence of the means necessary for effecting the developemnt of the body is considered.

Food may be defined to consist of all ingesta taken into the body by which nutrition is effected or assisted. This definition, which is more general than any of those usually adopted, includes not only the alimentary substances

derived from the animal and vegetable kingdoms, and the inanimate bodies salt and water, but likewise atmospheric air.

PROXIMATE PRINCIPLES OF ANIMAL FOOD.

To appreciate the effects of different sorts of aliment, some acquaintance with their chemical nature is requisite. A striking difference exists for the most part in the composition of bodies belonging to animals and vegetables: those which appertain to the former class are ordinarily composed of four elements—oxygen, hydrogen, carbon, and nitrogen, or, in other words, of water, carbon, and nitrogen; whilst those derived from the latter generally contain only three elements—oxygen, hydrogen, and carbon, or water and carbon. This difference in the number of the component elements of animal and vegetable bodies is not always found to exist: for some animal substances, as fat, the resin of the bile, &c., are composed of three elements only, like most vegetable bodies; and, on the other hand, some vegetable productions, as the cerealea, &c., contain the four

elements peculiar to the greater number of animal substances.

It would be natural to infer from these remarks that those kinds of alimentary matter which are most complex, and contain the greatest number of elements, must afford most nourishment, and such will hereafter be shown to be the fact; for the most nutritious kind of food is obtained from animal bodies, and from the most compound vegetable substances. The four elements composing animal alimentary substances are presented to us, as food, under the form of the proximate principles, fibrin, albumen, gelatin, osmazome, fat, and oils. Each of these will be examined in succession, for they constitute an immense variety of articles of diet, obtained from the following classes of the animal kingdom, viz. mammalia, birds, reptiles, fishes, mollusca, and insects, though it ought to be observed that the four first classes furnish man with a much larger quantity of food than the others.

FIBRIN.

The muscles of animals are principally composed of this substance: its proportionate quantity is greatest in flesh which is dark-coloured, and belongs to animals that have attained their full growth. Its physical characters vary in different species of animals, and in the same animal at different ages, on account of being mixed with various kinds of colouring matter. In beef and mutton it is of a full red colour; in pigeons and many kinds of game it has a brownish hue; it is pink in veal, salmon, pork, rabbit, chicken, and other kinds of poultry. In most fishes and animals of the lower classes which serve for food it is semi-transparent and colourless; though, amongst all the different creatures from which nourishment is obtained, fibrin may be said to present almost every variety of colour. Fibrin is not only met with in the muscles of animals, but in many of the internal organs also, which it renders highly nutritious. Pure fibrin, when moist, is white and opaque, but in a dried state

it has a dark appearance. It resists putrefaction for a considerable time, whilst kept in the air or immersed in water. On exposure to a high temperature it contracts and shrinks, and on being burnt gives out the strong odour of burnt horn or feathers. It is corrugated by boiling, and is insoluble in alcohol and cold water. The purest form of fibrin met with, under ordinary circumstances, is the fibre of meat which has been boiled slowly, for a considerable time, in a large quantity of water, as that which is obtained from meat employed for making bouillon or beef-tea. In this country meat so boiled is not generally eaten, because it is not considered nutritious; but in France, as must be well known, it is a very common article of diet. No doubt it is not so nutritious as meat subjected to less boiling, and which therefore contains a greater quantity of gelatin, &c., though it does not appear that any direct experiments have been made, with the view of ascertaining the relatively nutritive properties of fibrin. Though so particularly abundant in animals, fibrin cannot be

altogether regarded as a purely animal substance, for Vauquelin and other chemists have detected its presence in the juice of the Papaw-tree, in a state resembling that in which it is found in the blood.

ALBUMEN.

Albumen exists in two states in animal substances, uncoagulated and coagulated. Raw white of eggs presents the purest example of it in the former state, whilst cartilage, horn, hair, and nails, consist chiefly of it in the latter. It is one of the principal constituents of the blood, brain, and glands; and enters largely into the composition of oysters, whelks, periwinkles, and snails. It coagulates on being exposed, for a few minutes, to a temperature of 165° Fahrenheit, which causes different processes of cookery greatly to vary the digestible properties of substances containing an abundance of it. Eggs exposed to a high temperature, merely long enough to cause partial coagulation of the albumen, are much lighter and more digestible than they are after the

application of heat to them has been continued to complete it, or, as it is termed, till they are boiled hard. The digestible qualities of oysters may be modified in a similar manner. In a raw state, or when the albumen they contain is uncoagulated, a great number may be eaten without causing any bad effects. One of the most distinguished French physiologists of the present day used to declare he did not care about eating oysters, unless he could be supplied with at least twelve or fourteen dozen for his own share; a number he was continually in the habit of taking at one meal, without experiencing any symptoms of indigestion. Numerous other instances could be adduced of persons eating similar quantities with impunity. Stewed oysters, however, in which the albumen is coagulated, could not, in all probability, be partaken of with similar freedom, without causing a great derangement of the stomach.

GELATINE.

This substance is easily obtained by boiling different parts of animals, for some time, in

water, when the gelatine they contain is readily dissolved; and if the decoction be slowly evaporated, it may be gradually reduced to a tremulous substance, possessing a considerable degree of solidity, termed jelly. The integuments, bones, cartilages, tendons, and the ligaments of the joints, are the parts of animals which contain the greatest quantity of gelatine: hence the selection of the skin of the calf's head, leg of beef, ox-tail, and neck of mutton, for making soups and broths. The green fat of turtle, as it is called, is only part of the integument reduced to a state of gelatine by boiling. The uses of gelatine are very numerous: in the state of jelly, it is one of the most nourishing, useful, and agreeable sorts of food we possess. It constitutes the basis of all soups, and is also applied to a great variety of purposes, in the forms of glue, size, and isinglass. Recent experiments in France appear to show that the gelatine extracted from bones by long boiling, when eaten alone, does not possess the highly nutritious properties formerly supposed to belong to it.

OSMAZOME.

The word osmazome is derived from the Greek words *οσμη*, smell, and *ζωμος*, broth, and has been given to a substance which possesses remarkably sapid properties, and communicates to animal substances the peculiar flavour called savoury. It exists in greatest abundance in the fibrous organs of animals; but it is also found in the blood, and in the brain. The flesh of game and of full-grown animals contains the largest proportion of it. Vauquelin has discovered it in the mushroom, and Chevalier and Lessaigne assert that it exists in some plants belonging to the family of the Chenopodiæ.

MUCUS.

This substance enters very largely into the composition of animal substances. It is found in the saliva nearly in a pure state, and is also a constituent of most of the other secretions. Mucus is considered to be the primary animal substance formed, and the matrix from which

all the others are successively derived. It has therefore been regarded as the most important of all the proximate principles of animal bodies. The embryo of animals at the earliest periods of existence appears to be solely composed of a mass of mucus, parts of which, as the animal becomes developed, are gradually and successively converted into gelatine, albumen, and fibrin. Mucus is highly nutritious, and easy of digestion.

ANIMALS TAKEN AS FOOD.

Animal food is eaten in the greatest quantities in cold regions; many northern nations live almost entirely on it, scarcely ever partaking of vegetable substances, at least during the greater part of the year. Some tribes of people feed exclusively on land animals, others on aquatic ones. In order that some idea may be formed of the variety of animals eaten, a short notice will be given of those which are most generally consumed as articles of food. The animals most eaten in Europe are herbivorous; their flesh being milder, more tender,

and more wholsesome, than that of carnivorous animals. Europeans in general obtain the principal part of their animal food from oxen and sheep, and they do not consider animals fit for food until they have attained a considerable degree of growth. This is not the case with the inhabitants of some other parts of the world. The Chinese eat many creatures during the earliest periods of their existence, and therefore in such an undeveloped state, that we should consider them loathsome. Mr. Holman, the blind traveller, also informs us that, at an entertainment given him by the king of the island of Fernando Po, the uterus of a sheep containing two lambs, each about six inches long, was served up as a great treat, the dish being first presented to him as a mark of respect. Though our common ruminants are so generally eaten, some nations are restrained from feeding on them, by religious ordinances: thus many castes of Hindus are prohibited from partaking of the ox, and the ancient Egyptians were forbidden to eat of the sheep.

Horse-flesh is not an uncommon article of diet: in Denmark and Sweden it is said to be publicly exposed for sale in the markets, and M. Duchâtelet asserts that a very large quantity is consumed as food in Paris; the knackers and their families, who live principally on it, having a remarkably robust and healthy appearance. Baron Larrey states that the French armies, during many campaigns under Napoleon, were greatly indebted to horse-flesh for the means of subsistence. Marshal Massena, it seems, preferred it to most other kinds of meat. The Mongols, the Tongooses, and other nations bordering the Great Desert, hunt the Dziggtai, or Tartary horse, for food, the flesh being considered a great delicacy. The Tartars, Arabs, and Patagonians eat the flesh of asses; and the young ass was a great delicacy in the cookery of the ancient Romans. The pig, on account of its being so generally disseminated over the world, affords food to a vast number of the human race. Pork is one of the most nutritious kinds of meat we possess; hence the reason of its being, with such

advantage, preserved as an article of food by salting. Its taste is generally esteemed; and Galen says the different parts of the pig have as many as fifty different flavours, on which account he considers pork resembles human flesh. Dogs were formerly much eaten in Europe; Hippocrates, Galen, and Pliny, all mention their being used as food. Dogs and cats, according to Duchâtelet, are sold for food in Paris, though the traffic in them is tolerated rather than recognised. They are also eaten by the Chinese, by some negro tribes in Africa, by the people on the banks of the Missouri and Mississippi, and by the inhabitants of the South Sea Islands. Sir Joseph Banks and Dr. Solander commend dog's flesh as the sweetest meat they ever tasted, and from the following anecdote it would appear to be very wholesome. The celebrated Captain Cook, during his voyage round the world in 1774, was attacked at sea with a very severe illness, which induced great debility and loss of appetite. The surgeon who attended him considered his reco-

very would be greatly facilitated by fresh animal food, of which unfortunately there was none in the ship. His complaint at length became so alarming, that, as a last resource, it was determined to kill and dress a favourite dog in the vessel, belonging to a Mr. Forster, in the hope that it might serve as a substitute for the ordinary kinds of animal food, which could not be obtained. The dog was made into broth and other dishes for the captain, which proved highly beneficial, for they restored his strength and appetite so much, that in a short time afterwards he completely recovered.

Goats and kids are eaten in most countries where they are found. Elephants are considered delicacies in Cochin China; and when the king, or any of his viceroys in the provinces, has one of these creatures slaughtered for table, pieces of it are sent round to all the neighbouring persons of rank, as marks of favour and attention. These animals are also eaten in South Africa. Camel's flesh is used as an article of diet in Egypt; the ancient Romans were particularly fond of the heels of this

creature when young, "Cameli calcamenta tenerrima." In China, rats and moles are sold by weight, for food, in the markets. The dead rats thrown overboard from the shipping at Whampoa are picked up by the natives and used as food. The Mandingoes eat moles and squirrels. The inhabitants on the coasts of the Polar Seas, the Esquimaux, Greenlanders, Laplanders, Samoieds, Kamtschadales, &c., eat whales, walruses, seals, bears, beavers, otters, badgers, foxes, &c. The Normans, Flemings, and English are stated to have formerly prized as food the smaller kinds of whales met with in the Bay of Biscay. Whales' tongues are said to have ranked among the delicacies of the table during the middle ages. The Caffres eat lions. Bruce, the celebrated traveller, was, however, pronounced to be an impostor, because he stated, on his return to England, that he had eaten a piece of a lion in the north of Africa. The Bradypus melanotus is a common article of diet in South America, and is said to have the flavour of boiled mutton. The tapir and the armadillo are eaten by the Brazilians. The opossum is eaten in Peru and New Holland; and

the kangaroo in Australia. Monkeys are consumed for food in different parts both of Asia and America.

BIRDS.

The common gallinaceous birds, which afford such an abundant supply of nutritious matter to the human race, are natives of India. Pheasants (phasianus colchicus) are fabled to have been brought from Colchis, in Mingrelia (Iberia), whence they were gradually disseminated over Europe. During the time of the Ptolemies, these birds are said to have been so rare in Egypt, that some of those kings were unable to obtain any of them for their own eating, notwithstanding they offered a great price for them. The turkey, now so common an article of diet, is a native of America, or West India: hence its name, in French, of "dindon," or gift of Inde. It is found wild in Canada, Illinois, on the banks of the Missouri and Mississippi rivers, and in the north of Mexico, and was first brought to Europe by the Spanish Jesuits, in 1529. Sonnini says the first turkey that was eaten in France was served up at the feast

given at the nuptials of Charles IX., in 1579. Peculiar birds, eaten by some nations, are disliked by others: thus, though the common fowl is held in such general estimation, Mr. Salt mentions that several tribes of people inhabiting the country round the bay of Amphila, in Abyssinia, have a perfect abhorrence of the flesh of that bird. The rook-pies eaten by the English yeoman would disgust a Frenchman, as much as the idea of eating frogs does most of us. Several birds were eaten by the ancient Romans, which are now excluded from European cookery. The beautiful exterior of the peacock created a desire in their epicures to ascertain its taste; and accordingly it is recorded that Hortensius, the celebrated orator, and rival of Cicero, was the first person in Rome who had a peacock served up at table; which rarity he introduced at a sumptuous entertainment he gave to the college of pontiffs. Peacock's brains also constituted a choice dish among those people, and thrushes were much esteemed by them.

The eggs of several kinds of birds are eaten as food, as those of the common fowl, the phea-

sant, plover, pea-hen, duck, and goose. The Negroes, Caffres, and Hottentots eat the eggs of the ostrich; the South American Indians those of the emu; and the New-Hollanders those of the cassowary. The Esquimaux, and other inhabitants of the polar regions, eat the eggs of the sea-gull, auk, and many other water-fowl. Eggs are generally most prized when new-laid, but in Cochin China putrid and half-hatched eggs are considered delicacies, and cost thirty per cent. more than fresh ones. The Mandingo women in Africa are prohibited from eating eggs, though the men eat them without scruple. The Chinese and Malays are particularly partial to the nests of swallows, found in many parts of the south of China, in Java, Sunda, and other islands in the Indian Archipelago: the cause of their being held in such estimation by these people is owing to their being thought to have an aphrodisiac effect.

REPTILES.

The animals belonging to the class Reptilia which afford food to man are not numerous. The turtle supplies a very nutritious and whole-

some article of diet, and, now that the voyage between this country and the West Indies is made in such a short time by steam-boats, it will no doubt be imported in greater abundance, with much advantage to our population at large. Turtle was first introduced into this country, as an article of food, about the middle of the seventeenth century. The following extract from the 'Gentleman's Magazine' for the year 1753 shows it was at that time considered a great rarity:—"Friday, August 31. A turtle weighing 350 pounds was ate at the King's Arms Tavern, Pall Mall; the mouth of an oven was taken down to admit the part to be baked." The greater number of turtle consumed in London are brought from Jamaica, where much care is bestowed on breeding and preserving them; they are sold in the shops in that island at a less cost than beef or mutton. Some of them are so large, that one would be a sufficient repast for a hundred persons, and admit of fourteen men standing with ease, at the same time, on its back.

Serpents are eaten in many parts of the

world: the American Indians are very fond of rattlesnakes cooked as we dress eels. The anaconda, and other boas, afford a wholesome diet to the natives of the countries they inhabit. Adders are stated to be used as food in many parts of France and Italy. Crocodiles, the guana, and other lizards, are eaten in South America and the Bahama Islands. The bull-frog is considered in America as good as turtle. The Rana esculenta, or edible frog, is a favourite article of diet in France, Germany, and Italy. Toads seem also to be eaten by the French, though unwittingly. Professor Dumeril used to relate, in his lectures at the Jardin des Plantes, that the frogs brought to the markets in Paris are caught in the stagnant waters round Montmorenci, in the Bois de Vincennes, Bois de Boulogne, &c. The people employed in this traffic separate the hind quarters and legs of the frog from the body, denude them of their skin, arrange them on skewers as larks are done in this country, and then bring them in that state to market. In seeking for frogs, these dealers often meet with toads, which

they do not reject, but prepare them in the same way as they would frogs; and, as it is impossible to determine whether the hind quarters of these creatures, after the skin is stripped off, belong to frogs or toads, it continually happens that great numbers of the supposed frogs sold in Paris for food are actually toads.

The eggs of turtles, and of some of the larger kinds of lizards, and of crocodiles, are stated to be excellent food.

FISH.

Fish is a most important article of food, and, in all parts of the world, affords one of the principal means of subsistence to people residing near the coasts, on the shores of lakes, or on the banks of rivers. The more northern parts of Europe, Asia, and America produce very few nutritious vegetables, and the inhabitants of those places would die of famine, if they were unable to procure fish in great abundance. Fish contains large quantities of albuminous and gelatinous matter, which are frequently united with a considerable portion of oil: though nutritive, it is light, and not stimu-

lating, and therefore is often of great service, as an article of diet, to invalids. It does not favour the rapid developement of the solid parts of the body, on which account the jockeys at our race-courses, during the time they are trying to reduce their weight, live principally on it.

The ancient Egyptians and Syrians abstained altogether from fish. Pythagoras prohibited his disciples from eating it; and the Greek heroes considered it a kind of food likely to induce effeminacy, and therefore unworthy of a man. The early Romans entertained similar opinions respecting fish, and seldom eat any; though at a later period of their history it seems to have been a very favourite kind of food with them, and they partook of several kinds, as the dog-fish, echinus, star-fish, porpoise, &c., which are now seldom eaten in Europe. The Roman gourmands were guilty of more acts of folly and extravagance with respect to fish, than about almost any other article of food. They were in the habit of weighing them whilst alive at table; and to watch their agonies whilst dying was considered a piece of great entertainment. They also paid great attention to breeding and

feeding fish, and frequently paid enormous prices for particular kinds: thus Suetonius mentions thirty thousand sesterces, about 240*l.*, being given for a single mullet. The labrus scarus, or parrot-fish, was so highly esteemed by them, that they named it "the brain of Jupiter." Vedius Pollio frequently had culprit slaves thrown into his fish-ponds for the conger-eels, it being considered their flavour was much improved by feeding them on human flesh. Hortensius, the orator, is said to have sometimes shed tears when any of his conger-eels chanced to die; and the Emperor Domitian is related to have assembled the senate for the purpose of consulting that august body as to the best manner of cooking an enormous turbot which had been brought to him. Juvenal, in his fourth Satire, alludes to this extreme piece of weakness, in the following lines:—

> Atque utinam his potius nugis tota illa dedisset
> Tempora sevitiæ, claras quibus abstulit urbi
> Illustresque animas impune.
>
> Ah! as this day that he had pass'd the rest,
> And his dire reign had only been a jest,
> Nor Rome her noblest blood had tamely seen
> Flow unreveng'd!

In some countries fish when tainted, or even putrid, is preferred to that which is fresh. The inhabitants of the banks of the Senegal and Orange rivers pound some small fish of the size of sprats in a wooden mortar, as they are taken from the stream, and afterwards make them up into conical lumps, like our sugar-loaves, which they dry in the sun. In this state they soon become slightly decomposed, and give out a most unpleasant odour, notwithstanding which, these people consider them a luxury, and eat them dissolved in water, mixed with kouskous. Fish prepared in a somewhat similar manner is eaten by the Indians on the banks of the Orinoco. Some persons who have objected to eating animal substances, on account of the abhorrence they feel at different creatures being deprived of their lives for the sake of food, have abstained entirely from fish. Franklin, who entertained this opinion at one time, and therefore would not eat fish, though partial to its taste, gives rather an amusing account, in his 'Life,' of the reasons which led

him to alter it.—"I considered," says he, "the capture of any fish as a sort of murder committed without provocation, since these animals had neither done, nor were capable of doing, the smallest wrong that should justify the measure. This mode of reasoning I conceived to be unanswerable. Meanwhile, I had formerly been extremely fond of fish; and when one of the cod was taken out of the frying-pan, I thought its flavour delicious. I hesitated some time between principle and inclination, till at last, recollecting that when the cod had been opened some small fish were found in its belly, I said to myself, 'If you eat each other, I see no reason why we may not eat you.' I accordingly dined on the cod with no small degree of pleasure, and have since continued to eat like the rest of mankind."

INSECTS.

This division of the animal kingdom furnishes the human race with a considerable quantity of food in many regions of the globe.

Humboldt says, the children in some parts of South America may be seen dragging enormous centipedes from their holes, and craunching them between their teeth, without compunction. The white ant is eaten by the Indians in Brazil, Guana, on the banks of the Rio Negro, and Cassiquiaire. The negroes in the West Indies are very partial to a caterpillar found on the palm-tree. The Caffre hordes of South Africa feed upon locusts, ants, and a variety of insects too numerous for detail. Locusts and grasshoppers are eaten in Syria, Arabia, Egypt, Abyssinia, Madagascar, and China. The Chinese also eat the chrysalises of the silk-worm, the larva of the sphynx-moth, and a grub found at the root of the sugar-cane. Snails are taken as food in many parts of Europe. The earth-worm is eaten in Van Diemen's Land. The Greenlanders, Negroes, and Chinese eat the pediculus humanus: the Javans have also been accused of eating these insects, but this they deny, though they confess to biting them.

MILK.

This is one of the most important articles of diet derived from the animal kingdom, and has many remarkable properties worthy of notice belonging to it. In the course of this work it will be shown that the higher orders of animals require a mixture of different alimentary substances for their nutrition; for when they are limited to any one kind of food, their condition is either deteriorated, or disorganization of structure ensues. Milk is the only aliment which offers an exception to this rule, that is to say, which is capable of supporting life alone. Dr. Prout has well remarked that all other alimentary matters exist for themselves, or for the use of the animal or vegetable of which they form a constituent part. Milk, however, is prepared by nature expressly as food, being of no other use to animals whatever. It would naturally be expected that, since milk possesses the nutrient property in so eminent a degree, its composition must be peculiar, and contain a

greater diversity of the principles forming alimentary matter than other kinds of food. Such, indeed, is the fact, for every sort of animal milk is composed of albumen, oil, and sugar, suspended in a large quantity of water. The proportions in which these three substances are united, in different kinds of milk, vary exceedingly, but they have always been found to exist in the milk of all animals. The marked resemblance between the milk of different animals extends to that produced by the aquatic mammalia; for Dr. Jenner and Mr. Ludlow, both of whom had an opportunity of tasting the milk of a whale caught near Berkeley, describe it as being extremely rich, and having the flavour of cow's milk to which cream has been added. Milk is the earliest natural food of the young of all the higher orders of animals, and therefore they ought always to be supplied with it when possible. Some peculiarity probably exists, at this early age, in the gastric juices, which renders them better adapted for the digestion of milk. This is certainly the case in many

animals; for the gastric juice of the calf is much fitter for the digestion of milk, than it is in the same animal after it has attained the period of its full growth. The same modifications may probably occur to a certain extent in the human frame, for though milk is easy of digestion for some children after their infantile state, it is too heavy and stimulating for a great many; and few grown-up persons, in civilised life, are able to take it in any considerable quantity without inconvenience. Milk, however, is one of the chief articles of diet, among great numbers of the nomadic tribes of Asia, and other parts of the world: so that the difficulty of its digestion among us may partly be attributed to our not persisting in its use, and to the nature of our other kinds of food. The inhabitants of several immense tracts of the globe entertain a marked distaste for milk. The Chinese, the inhabitants of Java, and of the other islands in the Indian Archipelago, have almost as great an aversion to it as we should have to blood; and similar objections extend also to cheese and butter among these people. Sir

George Staunton informs us, that when the gentlemen composing Lord Macartney's embassy to Pekin wished to be supplied with milk, they had great difficulty in finding a person who understood the management of cows. At last, however, a man possessing the requisite information was procured, and embarked, with two cows and the proper nourishment, in a barge, to accompany the English ambassador's yachts upon their water-journey. The great distaste of the Chinese for milk is the more extraordinary, when it is recollected that many of their articles of diet are to us of a most filthy and disgusting nature. A similar dislike to it is entertained by some of the aboriginal inhabitants of the tropical regions of America, which perhaps may in some measure be accounted for, by the absence of animals which could afford a very abundant supply of it, before Europeans introduced our common ruminants into that part of the world. Others regard this accordance of taste with that of the Chinese as an argument in favour of a tradition that exists, of a regular communication having

been formerly kept up between the inhabitants of the east of Asia and those of the north of Mexico.

In the hyperborean climes milk is prized as an article of food by some races, whilst by others it is rejected. Linnæus informs us, that in West Bothnia the Laplanders obtain great quantities of it from the rein-deer, as well as from their cows, and prepare it for table in nineteen different manners. Rein-deer milk is very rich, and mixed with the milk of cows, renders the latter much fitter for making cheese. The Esquimaux, on the other hand, seem almost to dislike the milk of the rein-deer, and therefore hardly ever make any use of it. Milk cannot be considered as quite exclusively an animal production, for the Palo da vacca, or Cow-tree, of South America, furnishes a fluid very analogous to it, in its chemical, physical, and nutritious properties.

The care that nature has taken to provide for the young of animals this delightful aliment, which possesses such valuable properties, that alone it is capable of affording them

sufficient nourishment, during the period of their existence in which they are most helpless, ought to act upon us as a powerful incentive to ensure that the young of our own species should never be deprived of this, to them, invaluable treasure; and further, that they should always derive it, if possible, from the source which nature intended them to procure it from. The physiologist cannot own, without regret, how very commonly ladies in affluent circumstances neglect that most important of their maternal duties—the nursing of their own children. Weakness of constitution is generally pleaded as the reason for this dereliction, but the real cause is to be found in the disinclination of the gay mother to renounce the frivolities of fashionable life. The public voice has been loudly raised to induce the legislature to interpose in behalf of children employed in factories, to prevent their health from being destroyed by too long application to labour, at an early age; and recently a law has very properly been made to restrain all persons from disseminating by

inoculation that baneful disease, the small-pox. Perhaps it would even be still more just, if all women were compelled by law to nurse their own offspring, except when they are really unable from ill health to do so. Females, in general, are not aware how likely they are to injure their own health, as well as that of their infants, by refusing to subject themselves to the trouble of nursing. Hundreds might have escaped the agonies of cancer, and of many other equally serious constitutional disorders, if they had only practised the self-denial necessary for suckling their own children. The slightest reflection must convince everybody, that since the female of the human race is peculiarly organised for this important function, any attempt to interrupt its performance must be prejudicial to her health. In order to furnish materials for the formation of the milk, a modification takes place, after childbirth, in the circulation of the blood. A large quantity of that fluid, instead of being employed to supply materials for the catamenia, is diverted to the mammæ, the vessels of

which become more active and enlarged to receive it. The increase in the quantity of the circulating fluid, thus made to flow to the mammæ, is to furnish those glands with the elements for forming the milk. This short account of the manner in which the secretion of the milk is effected must convince every one that the adoption of any plan to interrupt or arrest the peculiar function nature intended the mammæ to perform at this particular juncture must, in all probability, be followed by derangement of the health. The suppression of the secretion of the milk, though it may be sometimes necessary, is always attended with danger; for, if not followed immediately by bad consequences, it often lays the germ of serious maladies which become active in after-life. On the other hand, the mother who sensibly makes up her mind to undergo the trouble of nursing will be more than amply rewarded for her pains; she will have the satisfaction of feeling conscious that she has done all in her power to preserve her own and her infant's health, and will

become the object of those affectionate and endearing caresses, which a child at the breast bestows on its nurse alone. An excessive exertion must be made by the system, when such an abundant secretion as that of the milk, is to be got rid of in any but the natural way. The correctness of this assertion is proved by the fact, several times observed by the author in his practice as an accoucheur, that when a new-born infant refuses to take the breast, or cannot extract the milk with sufficient rapidity, he has found large quantities of a fluid resembling it discharged with the urine of the mother; showing that the kidneys under these circumstances have, in addition to their ordinary secretion, separated from the blood a fluid quite foreign to them. The human race, who, from their superior intelligence, can alone appreciate the effect such a result may have upon the health, are, from knowing what other nourishment to give in its place, the only beings able to deprive their offspring of their natural food; for animals have no means of supporting their young except by suckling them. In this respect,

our knowledge is sometimes a disadvantage to us; for though it gives us the power of weaning children whenever we please, the substitution of artificial for the natural food, at this tender age, cannot be made with impunity: the consequence is, that all infants who are deprived too soon of the breast are exposed to the risk of passing their childhood in the misery of weakly health, brought on from want of proper nourishment in the first instance. Even savage nations, in this particular, set their more civilized brethren an example worthy of imitation, almost all children amongst them being suckled a proper length of time. Some, however, go into the other extreme, for many Canadian savages are said to nurse their children till they are four, five, and often six or seven, years of age. In parts of Australia, the natives suckle their children till they are four and five years of age, though they are taught, long before they are weaned, to procure food for themselves. In the south of Italy, even, it is very common to see children two and three years of age taking the breast. Ladies in this country will never be in-

duced to take upon themselves the important duties of nursing more frequently than they do, unless convinced that by, neglecting them, they are likely to injure their own and their children's health. Fashion might prevent the common abandonment of this habit, though reason and common sense may be powerless in doing so. On this account, it is much to be regretted that an illustrious personage did not lately determine on nursing her infant, as most advantageous both to parent and child; for had that been the case, her example would have saved many hundreds of infants from being consigned to the tender mercies of hireling nurses. An eloquent modern writer, in speaking on this subject, observes, that, if he possessed a city, he would have a statue of a mother suckling her infant placed in the centre of it, as the emblem of domestic happiness. Another important consequence of a mother's not suckling her own infant, is well described by Dr. Conquest, in the following passage extracted from his work on 'Midwifery:'—"A very serious evil, arising

from a woman's neglecting this important duty, is the probability of her becoming more frequently pregnant than the constitution of most females can sustain without permanent injury. A woman who suckles her children has generally an interval of a year and a half, or two years between each confinement, but she who without any adequate cause does not nurse, must expect to bear a child every twelve months, and must reconcile her mind to a shattered constitution, and an early old age."

OLEAGINOUS SUBSTANCES.

Fatty matter is one of the least complex of animal products: it has some analogy with most vegetable substances, being composed like them of only three elements—oxygen, hydrogen, and carbon, and probably its use in nutrition does to a certain extent compensate, for the want of vegetable substances as food. This observation is supported by the fact that the hyperborean nations, who consume the largest quantities of animal fat, are

very often for months, and even years, unable to obtain any vegetable food whatever. The Esquimaux, for instance, who consider a draught of whale-oil a luxury, live chiefly on blubber, which is the fat of the cetaceous animals; and the Russians, Cossacks, &c., will eat candles, soap, and tallow of every description. A taste for some of these articles can be more readily acquired than might at first be supposed; for patients in our hospitals, who have been treated with fish-oil as a remedy for rheumatism, have in a short time begun to like it, and to prefer that which is most strong and rancid. Large quantities of fat produce highly stimulating effects on the constitution, enabling the body to resist the influence of excessive cold to an extraordinary extent, which is no doubt the reason of its being eaten in such large quantities by the inhabitants of very high latitudes. Some of our naval officers, who have commanded the different expeditions to the polar regions, think, with apparent reason, that their crews would have suffered much less

from the cold, if they could have lived more after the manner of the natives, and taken more largely of animal oleaginous substances as food. This species of nutritious matter is not prized by the inhabitants of cold countries exclusively, for in South Africa the mass of fat forming the tail of the sheep is held in great estimation by the inhabitants; and at Caripe, in Central America, the fat from the abdomen of the guacharo, a nocturnal frugivorous bird, is collected annually by the Indians, who preserve it for use as food, and call it butter, or oil, of the guacharo. At the same time, the quantity of fatty animal substance consumed by the inhabitants of hot countries is very inconsiderable, compared with that eaten by people residing in very cold regions, its stimulating influence rendering it unfit as a principal article of food in warm climates. Some animal oils are much milder than others, this is the case with butter, or the oil obtained from milk. Butter is a very wholesome article of diet, and is of especial use in aiding the digestion of vegetable mat-

ter, when taken in combination with it, in moderate quantities. Though now so common in Europe, it was hardly known to the ancient Greeks and Romans, for Apicius does not mention it, and Galen says he saw it only once. The Greeks were eventually taught the manner of preparing it by the Thracians and Scythians, and the Romans by the Gauls and Germans.

The inhabitants of the temperate and tropical regions of the globe consume large quantities of vegetable oils, which have quite an opposite effect on the body to that produced by animal fatty substances; for they are cooling instead of stimulating, and favour the action of the intestinal tube, which is always of great importance to the health, and particularly so when the food consists chiefly of vegetable matters. The great increase in the consumption of vegetable oil in this country, during the last twenty years, has had a very beneficial effect on the health of those people who have acquired a taste for it; for nothing more readily removes the inconveniences induced by

sluggish bowels than a liberal use of this delightful fluid. Yet there are many persons who have almost as great an aversion to olive-oil as they have to train-oil, a prejudice which they will do well to get rid of as soon as possible. The vegetable oil taken by Europeans as an article of diet is principally obtained from the olive, but the inhabitants of other countries partake of the oil of a great variety of plants, as the walnut, the hazelnut, and the beech. In tropical regions, the oil of different palms is much used. In Africa and in India, an oleaginous substance resembling butter is obtained from the Bassia butyracea, or butter-tree. It is stated that in China castor-oil is made esculent by some peculiar process. But of all the plants from which oleaginous matter is obtained for eating, the olive will, by degrees, become most universally cultivated, because it furnishes an oil superior to all other kinds, both in wholesome and nutritious qualities. It is one of those important plants, the history of whose dissemination must be interesting to every one; and therefore it may be

mentioned, that it is supposed to have been carried by the Phœnicians from Syria into Barbary, and the south of Europe. The olive is indigenous to the Old World, and was first imported into America by Antonio de Ribera, who conveyed it to Peru in 1560.

CANNIBALISM.

Cannibalism seems to have been practised by different people in all ages, and at present is common among many barbarous nations. The general prevalence of this custom proves the correctness of an assertion made by an Oriental poet, "that man is more extravagant in his habits, and more singular in his tastes, than any other animal." Human flesh is said to have the flavour of pork, and to be as tender as veal. The Cyclops, the Sestrygon, and Scylla, are all described by Homer as anthropophagi, or man-eaters. Circe and the Syrens first entrapped their victims by pleasure, and then devoured them.

Diogenes, Chrysippus, Zeno, and all the stoics, contended it was very reasonable for

men to eat one another. Livy asserts that Hannibal, in order to increase the hardihood and ferocity of his soldiers, used occasionally to have them fed on human flesh. However much such practices may shock us, they have occasionally been adopted, in periods of scarcity, and under circumstances of great excitement, in more modern times, by some of the most civilized nations on the earth. St. Jerome says that some of the inhabitants of Britain were cannibals; and in the reign of Henry I. the Scots are stated to have killed and eaten some English, at Galloway. Schiller, in his 'History of the Thirty Years' War,' informs us, that the inhabitants of Lower Saxony were compelled to exist partly on cannibalism, in consequence of the dearth of provisions, caused by the devastations committed by the contending armies. The populace in Paris devoured the mutilated remains of the celebrated but unfortunate Maréchal d'Ancre, and the same class of people at the Hague ate the heart of their great countryman, De Witt. Louis XI., king of France, is said to have drunk the blood of

children for the benefit of his health. During part of the thirteenth century, cannibalism was very generally practised by all classes of society in Egypt. All sorts of stratagems were had recourse to for the purpose of entrapping people, to which physicians were particularly exposed; for persons pretending to be sick, sent for them under pretence of asking their advice, but really with the object of killing and eating them. The propensity to feed on human flesh has sometimes manifested itself in pregnant females. Prochaska relates an account, on the authority of Schenk, of a female, who was with child, being seized with an irresistible desire to partake of the arm of a baker, which she happened to see uncovered; and she prevailed on her husband to induce the baker, for a sum of money, to let her have a bite at it. Another woman, in the same state, killed her husband for the purpose of eating him, and salted his body in order that it might remain longer fit for food.

VEGETABLES TAKEN AS FOOD.

The vegetable substances employed as articles of food are seeds, roots, tubers, fruits, seed-vessels, stalks, leaves, bark, pith, and the sap or juices of plants. The most civilized nations derive the bulk of their vegetable food from seeds of various kinds, and particularly from some of the cerealea, as wheat, rye, barley, and oats, and from rice, maize, and millet. Wheat (*triticum*) is probably the most valuable of all these, and has been cultivated in the Old World from time immemorial. At present its habitat is most extensive, being only bounded in Europe by the 70th degree of north latitude; in Siberia by the 60th; in Kamtschatka by the 50th; in North America, on the west coast by the 57th, and on the east coast by the 52nd. It is also cultivated with the greatest success in middle and southern Europe, in middle Asia, in Arabia, Egypt, Abyssinia, Nubia, Barbary, in the Canary Islands, at the Cape of Good Hope, in the whole of the United States, in Cumana, on the elevated

ranges of South America, in the Brazils, Buenos Ayres, Chili, Australasia, &c. Notwithstanding that wheat is grown in so many different countries, the quantity of corn produced is only sufficient to supply a very small number of the inhabitants of the earth with the finer sorts of wheaten bread. On this account bread is often made of barley, potatoes, and oatmeal, which very frequently are mixed with less nutritive substances. The inhabitants of Angermanland, in Lapland, commonly make bread of one part of barley and three of chaff, though when the former is very abundant they add only two parts of chaff to one of barley. In Norway, during seasons of scarcity, the peasants eat chaff and the inner bark of pine-trees, separated from the scaly cuticle, which are ground and baked to make them fit for food. The bark is collected at the time the sap is rising in the tree, and after exposure for some time to the sun, is preserved for use in the winter. Bread made from these substances has a bitter taste, though it is said to be very nutritious. Besides the bark of the

pine, the ligneous fibres of the beech, birch, elm, lime, and poplar, when ground, dried, and sifted, to form an impalpable powder, have been used as food, and found to afford much nourishment. These facts are rendered more interesting by the experiments of Autenrieth of Tubingen, and others, for making bread of sawdust mixed with a small portion of flour, which, as Herschel has remarked, deserve a higher degree of celebrity than they have obtained, because they prove that absolute famine may be rendered next to impossible.

Bread made of the flour of wheat is generally esteemed, though many of the hyperborean tribes of people, and some South American Indians, have an aversion to it. It is rare, however, to meet with any one who has been brought up in Europe dislike it so much as never to eat it: yet such was the case with Azara, the Spanish naturalist. This celebrated individual ate bread till he was twenty-five years of age, when he left off taking it entirely, on account of its causing him indigestion. His complaint soon left him afterwards, but he

never resumed the use of this common article of diet: he did not substitute any particular kind of food for it, though he ate more vegetables and fish than meat. Azara's case would have been invaluable to Linguet, who wrote a book to prove that all the physical, moral, and political disorders in Europe proceed from the cultivation of wheat, and the use of bread as food.

Rye is produced in great abundance in the northern and temperate parts of Europe, Asia, and America, in New Holland and Van Diemen's Land.

The several varieties of barley (*hordeum*) constitute an important article of food amongst the inhabitants of Siberia, Norway, Sweden, Scotland, and Ireland.

Oats are also much cultivated for food, in the northern and temperate regions of the old and new world.

The different kinds of rice (*oryza sativa*) are next in importance to those of wheat. Rice is indigenous to the temperate and tropical regions of Asia, from which it has gradually

been conveyed to the North of Africa, Italy, and the southern provinces of the United States. The greatest part of the population of the globe subsists at present upon rice chiefly, including the Chinese, Japanese, Hindus, Malays, Persians, Arabs, Egyptians, Turks, Negroes, &c.

Millet seed is a common article of food among the Egyptians, Arabs, and Negroes.

Maize, another highly important sort of grain, is by some considered indigenous to America, where it is cultivated as far north as the 46° of north latitude: it is also met with on some of the elevated plains in this part of the world, 7200 feet above the level of the sea. A species of maize seems to have been grown in ancient Egypt, seeds of which are said to have been often found in the catacombs. Wheat (*triticum*) appears to have been first found in the valley of the Jordan, on the mountains of Lebanon, and in the parts of Palestine and Syria near Arabia. The zodiacs of many nations show the particular kinds of grain originally most in use amongst them. The Egyptian zodiacs represent Ceres or Isis under

the form of a female carrying an ear of corn, sometimes with both hands and sometimes with one hand only. The god of agriculture amongst the Chinese does not bear corn or barley as his emblem, and it is said no simple sign exists in the Chinese language to represent either corn or barley; whilst characters for both rice and millet, the sorts of grain particularly used by this people, are found in it.

The opinion that maize is indigenous to America is borne out by the fact, that the Mexican goddess of agriculture is represented carrying an ear of this plant.

FRUITS.

Fruits consist principally of gum, sugar, starch, and vegetable jelly, combined with different acids. They contain but little nutritious matter, though, on account of their flavour and coolness, they are very agreeable to the palate, and therefore much prized as an article of diet. Their use is particularly beneficial to the health, so that it is much to be re-

gretted they are not grown in greater abundance. Their dissemination over different parts of the earth has been very slow and gradual; and formerly their cultivation appears to have been attended to in particular places only, which, on this account, became celebrated for the peculiar sorts produced at them. Thus the country round the city of Apollonia or Mordia, in Epirus, was considered to afford the finest apples, and the best pears came from Crete and the Peloponnesus. The quince (*χυδωνιον μηλον*) which was consecrated to Venus, and the Hesperidean apples, were obtained from Cydon. Solon made a law which obliged the bride to eat a quince at her marriage feast, because the aroma of it was considered to communicate an agreeable perfume to the breath. The vine is indigenous to Palestine, Armenia, and Georgia; the peach to Persia; this latter fruit had not long been known at Rome in the time of Pliny, and was then very scarce and dear. Lucullus brought the cherry-tree to Rome, after he overthrew Mithridates: its name, cerasus, is derived from Cerasonte

in Asia Minor, to which country it is indigenous.

The fig-tree is found wild in Palestine and Syria, from whence it seems gradually to have passed to Cyprus, Crete, Rhodes, and other parts of Greece, and afterwards to Italy, Spain, France, and the south of Germany.

The mulberry-tree was not known in Italy much before the time of Pliny. The orange and the lemon are indigenous to the south of Persia, East Indies, and China, from which parts of the world they have been transported into most tropical countries, and the south of Europe. The East Indies is also the country of the tamarind, now grown in such abundance in the West India Islands. The pine-apple comes from America. The first specimens of this fruit introduced into Europe were brought from Santa Cruz, in Brazil, in 1534, and were presented to Ferdinand, King of Spain. Pine-apples have now been cultivated in the hot-houses of Europe for nearly two hundred years: they are also grown in great abundance on the west coast of Africa, and at the Cape

of Good Hope. Though they are indigenous to America, it is stated that they also exist in a wild state, in some parts of the East-Indies, at Celebes, in the Moluccas, Philippines, and in China.

NUTS.

Nuts are for the most part composed of farina, gum, mucus, and sugar, or of a basis of albumen united to a quantity of sugar and oil. Chestnuts form an important article of food in the south of Europe. Acorns are the principal vegetable food of the Indians in California. The almond is indigenous to Persia: it has always been much esteemed, and is mentioned in the Old Testament. The Greeks are said to have procured it from Egypt, and attended a good deal to its cultivation. The almonds of Naxos and Cyprus were considered the best. The walnut-tree is indigenous to Persia, Armenia, Syria, and Palestine, and has lately been found in a wild state on the declivities of the Himalaya. It was not known in Greece at the time of Alexander the Great,

though at a later period it was introduced into that country from Persia. It then passed into Italy, and was carried by the Romans into Spain, France, Hungary, and Germany. The Pistachio-nut was known to the Greeks, and, in the reign of Tiberius, was brought to Rome from Syria.

PROXIMATE PRINCIPLES OF VEGETABLE FOOD.

The proximate principles of vegetables will now be examined, in the same way that those of animal substances have been. They consist of gluten, gum, or mucilage, oil, farina, or starch, and sugar.

GLUTEN.

Gluten is the most important of them all, because it contains most nutriment, in proportion to its bulk, and is easily digested. In its composition it resembles animal substances, for like them it contains azote. A larger quantity of gluten is found in wheat than in any other vegetable substance used as food: hence the nutritive qualities of bread. Gluten

is also met with in barley, rye, beans, peas, chestnuts, acorns, horse-chestnuts, and in the juices of cabbage-leaves, cresses, scurvy-grass, rue, hemlock, borage, saffron, elder-berries, and grapes. Moist gluten swells considerably when suddenly dried. Dry gluten, exposed to heat, crackles, swells, becomes black, and exhales a fetid odour, like that given out by feathers or horn when burnt. By distillation water impregnated with ammonia, and an empyreumatic oil, are obtained from it, properties which point out its resemblance to animal matter. According to Marcet it is composed of—

Carbon . . .	55·7
Hydrogen . . .	7·8
Azote . . .	14·5
Oxygen . . .	22·0
	100·0

The wheat of warm climates contains a larger proportion of gluten than that grown in cold ones: on this account the wheat of the south of Europe is best adapted for the manufacture of maccaroni, and other farinaceous preparations in which a glutinous quality is required.

MUCILAGE.

Mucilage, or gum. Leaves, stalks, and seed-vessels owe their nutritive powers chiefly to the mucilage they contain, which is frequently united with saccharine matter. Most fruits contain a basis of mucilage, or farina, combined with sugar or oil. The former generally predominates in the pulpy fruits, with the exception of the olive: such fruits also generally contain a quantity of acid, in addition to their other ingredients.

Gum is a product of a great number of vegetables, particularly of the acacia mimosa, and of the cherry-tree. It is very nutritious, and is a common article of food among the Moors of Libya and Senegal.

FARINA, OR STARCH.

Farina, or starch, is the next most important nutritive vegetable principle, and abounds in most kinds of grain, and many other parts of vegetables. It is found in wheat, rice, barley, maize, millet, &c. Common starch may be

procured by making the flour of wheat into a paste, which must be held under a stream of water, and continually kneaded until the water runs from it colourless. The flour by this process is divided into two distinct parts, a tough substance of a dirty white colour, which is gluten, and a white powder: this is at first held in suspension by the water the paste was kneaded with, but is soon deposited, and is the starch. The facility with which starch may be separated from vegetable substances is of great importance, for otherwise many exceedingly valuable articles of food could not be obtained at all. Arrow-root is the starch of the Maranta Arundinacea. Sago is starch extracted from several species of palms in the Moluccas, Philippines, and other East India Islands. Salop is another starch, which comes originally from Persia, and is prepared from the roots of different species of orchis, as the morio mascula, bifolia pyramidalis. Sowans is a starch prepared from the husks of oats. Starch is often combined with poisonous substances, and many anxious mo-

thers will be surprised to hear that the mild, bland, demulcent Tapioca is obtained from the root of the jatropha manihot, a plant indigenous to the Brazils, Guiana, and the West India Islands, which is one of the most active poisons known, causing death in a few minutes after it has been swallowed. The roots of this plant, which contain a great quantity of sap, are peeled and subjected to pressure in bags made of rushes. The juice thus forced out is so deadly a poison, that it is employed by the Indians as a poison for their arrows. On being allowed to stand, however, it soon deposits a white starch, which, when properly washed, is quite innocent. This starch is then dried in smoke, and afterwards passed through a sieve, and is the substance from which tapioca and the cassava bread of the Indians is prepared. The discovery of the process for separating this powder from the jatropha manihot has been of the greatest importance to the human race, since it enables us to obtain a most valuable article of food from a plant that is of a highly poisonous nature, but

which contains an enormous quantity of nutritious matter; for it is asserted that one acre of manihot will afford nourishment for more persons than six acres of wheat. The manihot was carried by the Portuguese from America into Africa, where it now constitutes a common article of food. The potato is another vegetable, containing a great abundance of starch, for which we are also indebted to America, from whence it has been carried to nearly all parts of the world. Italy was the first place to which it was brought in Europe, being introduced there from Peru by the Spaniards, about the middle of the sixteenth century. Raleigh and Drake also brought it from Virginia, to England, about 1586.

SUGAR.

Sugar is a common ingredient in vegetable substances, particularly in those used as food. It is found in the greatest abundance, combined with mucilage, in the juice of the sugar-cane, the acer saccharinum or maple-tree, the manna-ash tree, and of beet-root. It is pro-

duced by most plants during their inflorescence, for nearly all flowers furnish honey to the bee, and it is a principal element in all the acerb, subacid, and sweet fruits. Many insects collect it: honey is gathered by the bee; a species of locust in New Holland covers the trees and ground with a kind of sugar, and the common aphis furnishes a saccharine secretion much sought for by the ant. A substance having a strong analogy to sugar is found in the bile of all animals. Sugar exists in animal milk, and considerable quantities are obtained in Switzerland from the milk of goats. It is also occasionally produced by morbid action of the kidneys, in the disease termed diabetes.

Sugar is a very wholesome and useful article of diet: its nutritious properties are well exemplified by the following curious case detailed by Dr. Copland. He states "that a lady about the middle age consulted him for great and increasing corpulency. Her countenance was full, clear, and florid; her pulse strong; her health excellent; and her strength very considerable. She partook of animal food only

once a day, and then in a very small quantity. She never took suppers, and was very moderate in the use of liquids. She had always taken considerable exercise on foot, and even up to the period at which he saw her, she resorted to it as much as the great bulk of her body would permit. The secret, however, of her increasing obesity was disclosed, when she mentioned her insatiable desire for refined sugar, which she almost hourly made use of, frequently to the extent of one pound weight daily. She considered it her chief article of diet: she reckoned the average quantity she used at three-quarters of a pound in the day. Tea or coffee was taken by her sweetened in the usual way. She ate the sugar in the solid state, and unaccompanied by any other article of diet; the finest sort only was relished. Her digestive functions were in a perfect condition; neither cardialgia, flatulence, nor acidity was complained of. Her teeth were sound. She found her corpulence supervene to a spare habit of body, some time after the practice of eating sugar was acquired. She thought that her

obesity increased with the quantity of sugar which she consumed. The habit had become so confirmed at the time Dr. Copland saw her, that she conceived it to be quite impossible to relinquish it." After this statement few persons will deny that sugar is nutritious. The negroes in our plantations all get fat when the cane becomes ripe enough to eat, of which they consume large quantities.

Sugar is esteemed by almost all people, except those who live principally on animal food, for Captain Lyon mentions that the Esquimaux manifested extreme disgust at the taste of the sugar, sweetmeats, and gingerbread which were given to them. Sugar is supposed by many to be injurious to the teeth; but this is not the case, except when eaten in such excess as to cause indigestion. It is antiseptic, and preserves vegetable and animal substances from putrefaction; accordingly, it is often used for making conserves, and as an aid in curing salted provisions. The sugar of the sugar-cane was unknown in Europe before the conquests of Alexander the Great. The Venetian mer-

chants, during the time of the Crusades, imported large quantities of it into Italy, though even then it was so scarce as to be employed for medicinal purposes only. The use of sugar has gradually become more general, since the discovery of America, and the introduction of the sugar-cane into that part of the world for cultivation; though, notwithstanding the enormous quantities imported from tropical climates, and manufactured from beet-root, it is calculated that four-fifths of the population of Europe never taste it at all.

GEOPHAGISM.

Among the variety of substances taken as food some nations eat quantities of earth. The Otomacs live almost wholly on it for months together, in the years when provisions are scarce, and are so fond of it that they continue to eat it when well supplied with food. The negroes of Guinea, the Javanese, the New Caledonians, and many South American tribes, eat clay as a luxury, and the Guajeroes, on the west of the Rio de la Hache, carry a little box

of lime with them, as sailors do a tobacco-box. The German workmen at the mountain of Kiffhönser are stated to spread clay instead of butter on their bread: they call it stein-butter, and find it satisfies their hunger like other food, and is very easy of digestion. Dr. Russell, in his 'Natural History of Aleppo,' mentions that a kind of fuller's earth, called byloon, is brought to that city in great quantities, and carried about on asses to be sold in the streets. This earth is mixed with dried rose-leaves, and made up into balls: it is principally used in the bagnio, by way of soap for cleansing the hair, but a great quantity is eaten by pregnant women and sickly girls. The inhabitants of Capua are related to have formerly paid a tribute to the Neapolitans for a kind of earth called leucogæum, which they made use of in the preparation of a dish named alica. The banks of the Mackenzie River, a few miles above the Bear Lake, contain layers of a kind of unctuous mud, which the Indians in that neighbourhood eat occasionally during seasons of scarcity, and also take it even at other times for an

amusement. It is said to have a milky taste, and that the flavour is by no means unpleasant. An earthy substance found on the banks of the river Kamen-da-Maslo is eaten in various ways both by the Russians and the Tongousi. It is of a yellowish colour, and not unpleasant in taste, though it is pernicious to the health, producing various disorders, as the gravel, &c. In India lime is commonly eaten with the betel-leaf.

Granivorous birds require to be supplied with a quantity of earthy matter, and have the faculty of distinguishing one kind of earth from another. They all swallow great quantities of siliceous stones, the noise of which, grinding one on the other in the gizzard, may be distinctly heard by placing the ear against the chest of a common fowl. Birds also swallow large quantities of lime, probably to obtain matter for the formation of the shells of their eggs.

All edible earths most likely contain portions of organic matter, which is the reason of their being taken as food. Such, at all events, has been found by Professor Retzius to be the case

with the bergmehl, or flour of the mountain, at Degerfors, on the frontiers of Lapland, which is eaten in times of scarcity by the inhabitants, made into bread with the flour of corn, and of the bark of trees. According to Retzius, it contains the remains of nineteen different forms of infusoria with siliceous carapaxes, several of which are similar to those belonging to some of the animalculæ met with in a living state near Berlin. The earth-worm swallows large quantities of moist earth, which always has minute particles of animal and vegetable substances mixed with it, and this small quantity of nutriment is sufficient for the subsistence of this creature. Many marine animals, echinodermata, fish, &c., seem to feed almost exclusively on sand, but then that sand abounds in fragments of shells, which have been reduced to powder by the rolling of the waves on the shore. All these facts show how parsimonious Nature appears to be of organic matter, since such great care is taken that none of it shall be wasted.

CONDIMENTS.

Man, in order to vary the flavour of his food, or merely to gratify his sense of taste, often partakes of what are called condiments, which consist chiefly of spices, bitters, and salts. Some of these substances are eaten alone, and possess important properties which influence nutrition, whilst others are mixed with almost every variety of food, and do not possess any nutritious properties at all. The selection of condiments frequently depends upon caprice, for the taste of many of these substances is at first found disagreeable. Bitters, tobacco, garlic, assafœtida, olives, &c., are generally disliked when first eaten, though by continued use a relish is gained for them. On the other hand, the frequent repetition of flavours which are originally grateful often causes satiety, or even disgust: thus substances which merely possess sweetness are very apt to cloy.

Spices are eaten in the greatest quantities by the inhabitants of hot countries: they are

most useful in promoting the digestion of vegetable food, and they act as powerful preventives to the increase of intestinal worms, to which they are poisonous. It is interesting to find that the plants which produce some of the hottest spices, as the different kinds of capsicum, grow in a natural state on the margins of the rice-grounds of India. It seems as if nature had been careful to furnish a liberal supply of them, in those situations where they are most required; for the rice-diet of the Hindoo would soon prove prejudicial, if persisted in without an admixture of spice. Almost every hot country has its peculiar spice. Black and white pepper come from Malabar; cardamoms from the East Indies; nutmegs and cloves from the Moluccas; cinnamon from Ceylon; pimento from South America and the West India Islands; ginger from the East Indies; and vanilla from South America. Spices are relished by almost all nations. Pepper was a favourite ingredient of Roman cookery: it used to sell in ancient Rome for fifteen denarii, or ten shil-

lings a pound. The ransom paid to Alaric to raise the siege of Rome consisted of five thousand pounds of gold, four thousand robes of silk, three thousand pieces of scarlet cloth, and of three thousand pounds weight of pepper. Many animals and birds, inhabitants of hot countries, partake of different kinds of spice, particularly during the wet and more unhealthy seasons of the year. The stimulating effect of spice is most useful in tropical countries, where it produces sufficient excitement in the body to enable it better to resist the septic and depressing influences to which the inhabitants of warm and moist climates are exposed. The effect it has on the system is somewhat analogous to that produced by alcoholic liquors, for which, in hot climates, it may to a certain extent be regarded as the natural substitute. Persons accustomed to the constant use of spices eat them in large quantities: a curry seasoned to an Indian palate will generally prove much too hot to please that of a European. Few dishes are fitter for many dyspeptic stomachs than cur-

ries, moderately seasoned. The spices they contain communicate a most beneficial stimulus to the digestive organs, which frequently causes them to perform their functions in a healthy manner when nothing else will. Curry is likewise very serviceable to persons troubled with habitual costiveness, and often causes the bowels to act spontaneously. Upon the whole it is one of the most useful dishes in the hands of the dietician with which we are acquainted.

BITTERS.

Bitters may be considered to constitute another class of condiments. They are seldom taken alone, except medicinally, but are found to exist more or less in almost all kinds of vegetable food, which would be unwholesome to man and animals without the bitter extract it contains. Bitters act particularly on the stomach: they increase its digestive powers, and improve the appetite: they are also very destructive to the different kinds of worms found in the digestive tube, being some of the

most active anthelmintic remedies known. They are poisonous to many other kinds of insects, on which account the secretion of the auditory glands most effectually deters insects from intruding into the external orifices of the ears. Bitters are so mild in their operation, that they can be administered with advantage to persons of almost all ages. Their beneficial influence on the digestive organs has led to their introduction with the greatest advantage into many beverages, as hops in beer and ale. Some animals derive the greater part of their sustenance from food containing abundance of bitter extract, as the rein-deer, which feeds on the lichen moss. This moss is very useful to invalids, and constitutes a mild and slightly stimulating article of diet, well adapted to weakly constitutions.

SALT.

Salt is a very important article of diet. The higher orders of animals have a great relish for it; and indeed it seems to be a natural stimulus to the digestive organs of all

warm-blooded animals. Oxen, sheep, goats, deer, antelopes, &c., partake very liberally of it. Many beasts of prey which inhabit the central parts of Africa and America travel immense distances for the purpose of visiting the salt-pans which are occasionally met with in the interior of those vast continents. Some of these pans have been discovered by following the tracks of their footsteps. In America there are many salt-springs, called 'licks,' which are greatly resorted to by all sorts of animals. It is rather extraordinary, but it may be affirmed with tolerable certainty, that the superior animals of a former creation, many of which have become extinct, were as fond of salt as an article of diet, as those now inhabiting the surface of the earth. At a salt spring in the county of Boone, in the state of Kentucky, on the south-east of the Ohio, an immense number of fossil bones of the mastodon, mammoth, &c. have been found, in consequence of which it has been named Big Bone Lick. The animals to which these bones belonged were most probably attracted

to the spring to lick the salt; and as great numbers of wild creatures of all descriptions necessarily met at this spot, no doubt many deadly combats ensued between them, which will account for the quantity of bones found at this place. In the arrangement of the strata of the globe, Nature has ensured living beings a most liberal supply of salt; for, independently of our being able to obtain it in almost unlimited quantities on the coasts from sea water, in inland countries it is found in a mineral state in the bowels of the earth. Rock-salt, and salt springs are stated to be most frequently met with in strata of the red sandstone formation, though the salt-mines of Wielezka and Sicily are in the tertiary, and those of Cardona in the cretaceous formations: in the Tyrol some are in the oolitic; and near Durham salt springs exist in the coal formation.

Almost all persons find salt agreeable to the palate, though some have a dislike to it: abstinence from it is very injurious to the health, indeed a certain portion seems absolutely ne-

cessary for healthy nutrition; for it enters largely into the composition of nearly all the fluids of the body, and a large quantity is thrown off by many of the secretions, which waste must be supplied. Particular care should be taken to prevent children eating their food without salt. An intimate friend of the author's, who was much devoted to literary pursuits, left off eating salt with his meals, and consequently became troubled with imperfect digestion, and great derangement of the health. He was recommended to resume the use of this substance: by degrees, though not without difficulty, he overcame the aversion he had taken to it, and in a short time afterwards his health was re-established. The salutary influence of salt is also to be attributed to its imparting savouriness to our food, exciting the flow of the saliva, the gastric juice, bile, pancreatic juice, and secretion from the glands of the lining membrane of the intestinal tube. It has likewise an aperient effect on the bowels, from increasing the vermiform action of their muscular coat. Salt is a powerful anthelmin-

tic. Almost all persons who abstain from it are troubled with worms. The criminals in Holland, who were formerly fed on bread without any salt, were dreadful victims to these parasitic creatures. Salt is very dear in the Mauritius, on which account the negroes get very little of it, and are terribly infested with worms. Bread is much more wholesome and digestible when it contains salt: the bakers are sometimes, but without reason, accused of committing a fraud by putting salt into their bread. The quantity generally used is a pound of salt to a bushel of flour, at which rate every adult consumes about two ounces of salt a week, or six pounds and a half a year, in bread only. The dearness of salt some years back, in consequence of the heavy duty, made it impossible for the poorer classes to obtain a sufficient quantity of it. The inhabitants of many parts of the coast, where fish is very abundant, were therefore often obliged to eat it without salt, which proved very injurious to their health. This useful substance is now much cheaper, because the tax on it

has been remitted. It is the part of a wise and enlightened legislature to relieve all commodities which are necessary for preserving the health of the people from every kind of fiscal burden. In Manding, and some parts of the interior of Africa, salt is so scarce, and is considered so great a luxury, that all persons who can obtain enough of it to eat regularly with their meals every day are reckoned very rich. In the market at Boori salt is bartered for gold, and children are to be seen sucking a piece of salt, as they would sugar in Europe. The longing for salt, particularly after a continued use of vegetable food, is said to be extremely painful. Alexander Selkirk, the hero of Robinson Crusoe, mentions how much he suffered from the want of salt and bread, until he had acquired the habit of relishing his meat without either.

WATER.

Water is an important article of diet, being the chief drink of all animals: it is also absorbed by plants. Water is the basis of all

other drinks, and is the principal potation in use; for notwithstanding that beer, wine, &c. are common beverages in many countries, nine-tenths of the human race are content with pure water only. In several islands between the tropics, particularly in the Pacific Ocean, water is stated to be so scarce, that the inhabitants are obliged to supply its place, in great measure, with the milk of the cocoa-nut. In the Brazils, West Indies, Arabia, East Indies, and other tropical regions, many plants, as Pitas, Cardas, Bromelias, Caraguatas, are found, which afford a liberal supply of water when it cannot be obtained from any other source. These vegetables all contain a considerable quantity of this fluid, as clear as crystal, either in the stem, or in cavities and reservoirs formed by the leaves, which, being sheltered in this manner from the sun, is kept delightfully cool, and often affords the exhausted traveller, in hot climates, the means of quenching his thirst, when, but for these singular plants, he might be unable to obtain any water at all. Hoffman considered water

to be an universal medicine, capable of alleviating or curing all disorders. It is certain that, in the most dangerous diseases, the stomach will bear water, when it rejects all other liquids. The pleasantest water to drink is that which contains a great quantity of air, which renders it light and sparkling. Boiling deprives water of the air it contains, and this is the reason that water which has been boiled tastes vapid. Boiled water, however, recovers its natural taste after it has been allowed to remain some time in contact with the atmosphere, a portion of which it soon absorbs. The Roman epicures preferred water that had been boiled, after which it was mixed with snow: it was sold prepared in this manner, under the name of decocta, in houses of public entertainment in ancient Rome. Juvenal and Martial inform us that this luxury, which was borrowed from the Greeks, was much in use at Rome in their time. The Romans were also in the habit of drinking hot water at their repasts; the continued use of which rendered

the complexion pale and sickly, and weakened the stomach.

" Et potet calidam, qui mihi livet, aquam."

Martial, vi. Epigr. 86.

Persons of rank in China seldom drink water without its being distilled ; and every Chinese infuses tea, or some other vegetable supposed to possess properties beneficial to the health, in the water which he uses. Water is almost the sole beverage taken by the inhabitants of Java; and among people of condition in that island it is invariably prepared by boiling, and usually drunk warm. Rain-water tastes vapid, from the same cause which renders spring-water flat and insipid after boiling, for rain-water results from evaporation, by which it is almost entirely deprived of air. Water is so indispensable to organized beings, that they could not exist without it. Life, indeed, can be supported longer without food than without drink. Some physiologists consider it possesses nutritious properties; an opinion rendered more probable, since the researches

made with the microscope have shown it to contain a living world of its own, in the form of animalculæ. Fordyce informs us he confined some fish in a vase of distilled water, where they lived for fifteen months, without any other food, for the vessel was covered in such a manner, that no dust or nutritious matter could possibly fall into the water contained in it. Water is the principal agent of vegetation, and even the source of life in some animals, as in fish, for it is the medium through which these creatures derive oxygen for the arterialization of their blood. The necessity of water to life in all organized beings, and the influence it has upon the development both of vegetables and animals, great luxuriance of vegetation being dependent on an abundant supply of moisture, and the largest animals being aquatic, no doubt led to the adoption of the opinion that water was the great productive element, from which all things are capable of being formed, and into which they were finally resolved. The "αριστον μεν υδωρ" of the poet—"water is the noblest"—is probably an expres-

sion of this doctrine, which the Greeks received from the Egyptians, and which the alchemists of more modern times revived.

Water, when drank, immediately modifies our thirst, which is a sensation felt in the mucous membrane of the mouth, pharynx, and digestive canal. Thirst results from the continued loss of fluids which the body incurs by the discharge of the secretions, and exhalations, and by perspiration. If a fresh supply of fluid were not introduced into the body, death would ensue. No sensation is more gratifying than that which follows the satisfying our thirst, and no fluids produce this effect so well as water, and the fluids of which it forms the principal basis. Drink, after entering the stomach and intestines, is absorbed by the mesenteric veins and chiliferous vessels, by which it is conveyed to the blood, which it dilutes. The course taken by fluids introduced into the stomach explains, as Dr. Paris very properly remarks, the advantage of taking some beverage, as tea or coffee, four or five hours after dinner. By that time digestion is completed,

and the essences of the food are beginning to be poured by the absorbent vessels into the blood, which may therefore require dilution. Large quantities of drink during dinner should be avoided, because they are likely to weaken the digestive powers of the stomach by causing its distension, and, by diluting the gastric juices, diminish their solvent powers. Persons troubled with bad digestion frequently find it much improved by abstaining from all drink during dinner, and only taking a small quantity at its termination.

In proper quantities, water and other drinks not only aid digestion by their power of softening and dissolving the food, but they likewise perform a most important part in many other functions, as absorption, secretion, and nutrition. Water also enables us to take food in a liquid form, which is often of great consequnce in disease: hence our decoctions, gruels, broths, soups, &c. It is, however, proper to mention that such food taken alone, on account of its fluid state, does not remain long enough in the stomach to be digested. Soups, though made

very strong, are not nutritious when taken by themselves: they should be eaten with solid substances, as bread, rice, maccaroni, &c., by which they are imbibed, as by a sponge, and thus retained in the stomach long enough for the gastric juices to act upon them, or, in other words, to digest them.

The inhabitants of hot climates are generally supposed, though erroneously, to drink a greater quantity of water than those of cold ones. People living in the temperate parts of the earth certainly drink less than the residents of the tropics; but the inhabitants of the hyperborean regions consume a much larger quantity of water than those of the hottest countries. Captain Lyon mentions that the Esquimaux drink water in enormous quantities, by gallons at a time, and two quarts at a draught: he considers this large supply of liquid is probably necessary to dissolve their gross food. Water is a scarce article with these people in winter, because during that season they can only obtain it from snow artificially dissolved. This is the reason the Tchuktchi,

and other inhabitants of high latitudes, when no fuel can be obtained, have recourse to very filthy and disgusting means for melting the snow, in order to procure water to drink.

Drink passes with great rapidity from the stomach to the circulating system, by which it is conveyed with the blood to all parts of the body: it is afterwards very soon got rid of by exhalation, perspiration, and the action of the kidneys: on which account large quantities of fluid can be introduced into the body with comparative impunity. It is difficult to say, with accuracy, what amount of drink can be taken in a period of a few hours without great inconvenience. Boerhaave mentions a man who drank ten pints of wine daily; and Haller gives instances of patients taking two hundred ounces of mineral waters in a few hours. The history of the sot of Syracuse, who could drink wine during the whole time required to hatch eggs, is well known. The abuse of too great a quantity of drink, whether of a stimulating nature or not, is highly prejudicial to the health, inducing flaccidity of the solids, and often producing a

tendency to dropsical deposition. People in general drink a great deal more than is necessary, and indeed, upon the whole, commit greater excesses in drinking than in eating; though it is much more common to hear the latter condemned than the former, except when fermented liquors are taken. The weak, irritable state of body induced by drinking too large quantities of tea ought not to be referred solely to the tea, but partly to the effect the quantity of hot water introduced into the body has upon the system, by attenuating the fibrinous portion of the blood.

SPIRITS.

The art of separating spirits from fermented liquors appears to have been first discovered in the East. The ancient Greeks and Romans were both ignorant of it, and Europeans only acquired a knowledge of it from the Arabs, about the twelfth century. In the fourteenth century the Modenese are stated to have used alcohol brought from the south of Germany, as a preservative against the plague and other

contagious disorders; but the manner in which it was prepared was kept secret. By degrees it got into general request, in consequence of the extravagant praises bestowed on it by physicians for its extraordinary medicinal qualities. From being first taken as a medicine, alcohol was soon used as a cordial, and various attempts were made to render its taste more agreeable. The Italians were most successful in improving its flavour, by the addition of spices, sugar, &c., and invented the preparations named liquori or liqueurs; which were introduced to public notice at the fêtes given on the occasion of the marriage of Henry II. with Catherine of Medicis, in the year 1533, after which they soon became generally fashionable in France.

Rum is a spirit obtained from the fermented juice of the sugar-cane; and arrack is distilled from rice. The nomadic Tartar races, as the Kirghises, Bashkirs, and Kalmucks, procure a spirit named aracu, or arraca, from sour milk.

WINE.

The invention of wine is hidden in the darkest obscurity: it is prepared from the juices of many fruits containing saccharine matter. The vine seems to have been first cultivated for the purpose of making wine in the warm countries of Asia. It is indigenous to the Holy Land. Noah found it in the land of Canaan, as is shown by the twentieth and twenty-first verses of the ninth chapter of Genesis:—"And Noah became a husbandman, and planted a vineyard; and he drank of the wine, and was drunken." The Phœnicians introduced the vine into Greece, from whence it passed into Italy; and the Romans carried it into France, Switzerland, and Germany, where it was planted on the banks of the Moselle, Maese, Rhine, Neckars, and Donau. In ancient times, wine was so rare in Europe, that it was seldom used except at the sacrifices to the gods. It is curious to see how many different nations have prided themselves on being able to resist the intoxicating properties of wine. Darius,

the son of Hystaspes, caused it to be recorded in his epitaph, that, among the other valuable qualifications he possessed, he could bear more wine than any of his subjects. When Cyrus was preparing to attack his brother Artaxerxes, king of Persia, he published a manifesto stating he was more worthy of the throne than his brother, because he could swallow more wine. Before the Romans became degenerate, the young men under thirty years of age, and the women all their lifetime, were prohibited from drinking wine, except at a few religious ceremonies. The custom among these people of saluting female relations originated, it is supposed, from the desire to ascertain if they had been drinking wine. These restrictions were gradually removed as luxurious habits became more general. The Romans, in drinking the health of one another, made use of the toasts "Bene mihi," "Bene vobis." They also frequently took as many cups, "cyathi," as letters in the names of the persons they drank to, or as they wished years to them, on which occasions they were said "ad numerum

bibere." They also had a favourite custom of drinking three cyathi in honour of the Graces, and nine in honour of the Muses.

BEER.

Beer seems to have been in use almost as long as wine. It is commonly used in those countries to the north of Europe, the climate of which is too cold for the growth of the vine. Its invention is very old, though more modern than that of wine. Herodotus informs us the Egyptians drank beer, the discovery of which they ascribed to Osiris. Beer was also a favourite beverage of the ancient Scythians, Germans, and Gauls.

EFFECTS OF FERMENTED LIQUORS.

The precise manner in which spirits act on the system is not known, but the following observations prove that they have a direct influence on the blood and nervous system. An ounce of alcohol injected into the vein of the leg of a middling-sized dog communicates in a few seconds the odour of spirit to the air

forced from the chest during expiration. An animal treated in this manner falls down in a state of insensibility; respiration becomes quickened and stertorous, and the action of the heart is accelerated. After about ten minutes respiration ceases, and death ensues. The examination of the body shows the blood in both sides of the heart dark-coloured, partially coagulated, and giving out a strong odour of alcohol: the brain and spinal cord also smell strongly of alcohol. The fluid in the brain and spinal cord of the human body, in cases of death from intoxication, has been found highly charged with spirit. Sir A. Carlisle has stated, that in a case of a female who died from the effects of intoxication, in the Westminster Hospital, the fluid in the ventricles of the brain had a strong odour of gin; and Ogston mentions that, in several similar cases which came under his notice, the fluid in the brain and spinal marrow possessed all the physical and chemical properties of diluted spirit of wine.

These are the most palpable effects of spi-

rituous liquors on the human body, and are sufficient to prove how injurious they must be to the health. The presence of spirit in such large quantities in the principal nervous centres explains why its continued abuse usually causes disorganization and derangement of those structures. Insanity and other nervous affections are more frequently produced by drunkenness in this country than by any other cause. Nervous disorders, particularly epilepsy, induced by excess in spirituous liquors, are mostly incurable. Affections of the heart, liver, gout, stone in the bladder, and gravel, are a few of the other ordinary results of hard drinking. Nothing can place the exciting influence of spirits on the system in a stronger point of view, than the fact that sailors, and other persons, when in a complete state of inebriation, frequently pass the night on the pavement of the streets, in the depth of winter, without being affected by the cold. The effects of spirits are somewhat analogous to those of many fevers, in which cold ablution of the whole body is often extremely serviceable,

though the adoption of such a plan of treatment on a person in good health, and who was unaccustomed to it, would most commonly cause a severe illness. There can be little doubt the human race, up to the present time, has been more injured than benefited by the discovery of alcoholic liquors. All persons should avoid taking them as much as possible, particularly those who are engaged in pursuits requiring much mental exertion. On the other hand, in cases of weakness and disease, where stimulants are necessary, alcoholic liquors are extremely beneficial, and therefore their use ought not, as the teetotalers pretend, to be entirely renounced. In many fevers, and in great depression of the powers of the system, they are extremely useful. Very frequently a delicate female, who is attacked with hæmorrhage after her confinement, and who has been quite unaccustomed to the use of alcohol in any shape, will take a whole bottle of brandy in a very short time, without experiencing the slightest inconvenience from it; but on the contrary, she will find herself greatly invigorated, though without this stimu-

lus she would most likely have died from exhaustion.

TEA.

Europeans first became acquainted with tea in their travels to China, during the sixteenth century. The Dutch imported some into Holland at the beginning of the seventeenth century, at which time it could usually be procured at the druggists' shops of Amsterdam. Lords Arlington and Ossory introduced it into England from Holland in 1666. Its cost at this time in London was 30*s.* a pound. Since that period the demand for tea has gradually increased, and its price has considerably diminished. Tea is of great importance in dietetics. It has tended greatly to lessen the consumption of ardent spirits and fermented liquors, and has therefore conferred a great benefit on those nations amongst whom it is much used. The infusion, taken moderately strong, excites the nervous system slightly, without causing violent stimulating effects, or producing any unpleasant sensation afterwards. It thus affords us one of the most salubrious methods

of diluting the aqueous particles of the blood with which we are acquainted. Tea may be drank in all diseases, and is so congenial to the palate and stomach, that it rarely excites vomiting, for very frequently it will be retained in the stomach, when labouring under such extreme irritability as to reject all other fluids, except water. In China, the infusion is drank alone; in Europe, milk and sugar are usually added to it; and in some parts of the north of Asia salt is mixed with it. In both Americas, in New Holland, and in the South Sea Islands, infusions of the leaves of several trees peculiar to those countries are in common use among the inhabitants as substitutes for tea, though their qualities do not appear to have been sufficiently relished by travellers to lead to their being imported into Europe, except as matters of curiosity. Tea drank in immoderate quantities causes nervous irritability; but this effect, as has been previously observed, should not be attributed solely to the tea, but partly to the influence large quantities of hot water have on the

nerves of the stomach, and in attenuating the fluids of the body. Tea being unknown to the ancients, it is frequently said that many modern disorders have been produced by its use. Probably persons who take it to great excess, and who are in a peculiar state of health, may be injured by it. At the same time, tea taken in moderate quantities, as a substitute for more stimulating drinks, is far more likely to preserve the health than destroy it; and the general use now made of it by some of the most civilized nations of the world, so far from being likely to do them injury, is on the contrary highly beneficial, and tends to relieve them from a great variety of inflammatory disorders. Tea is also eminently diuretic, and therefore materially assists the skin and kidneys in the performance of their functions.

COFFEE.

The use of coffee is as general as that of tea. The infusion, when strong, has a more stimulating effect than tea, and therefore ought not to be taken too liberally. The English,

when they first visit the Continent, are apt to drink the strong coffee which is presented to them as copiously as they have taken tea at home; and, consequently, they find it does not agree with them, but produces dryness of the skin, and other feverish sensations. This would not be the case if they limited themselves to the "petite tasse." The stimulating effect coffee produces on the brain is very striking: hence it is often drank by authors who "waste the midnight oil," to prevent drowsiness, and therefore it has been termed by the French "liqueur spirituelle." Coffee was first introduced into London in the time of Charles II., in 1652: it was originally prepared and sold there by a Greek. No coffee-houses existed in Constantinople before 1544. Mourad II., during one part of his reign, caused them all to be shut up, and forbade the use of coffee, because some devout Mussulman considered its use contrary to the law of the Koran, and declared that the faces of those who drank it would be found, when they rose at the day of judgment, to have turned black.

Coffee has been of quite as much service as tea in diminishing the consumption of fermented liquors; and, on account of its greater cheapness, daily contributes more extensively to the accomplishment of that desirable end.

COOKERY.

Independently of the great variety of food that exists, its condition is very much modified, among most nations, by subjecting it to different kinds of preparation. Few articles of diet are eaten, by civilized nations, before they are either roasted, boiled, broiled, stewed, baked, fried, steamed, salted, or smoked. The art of cookery consists in a knowledge of the manner of conducting these processes, and is a kind of information which has more influence on the well-being of the human race than is generally imagined. The most important changes produced in the food by cookery are, the destruction of its vitality, an indispensable condition for its digestion; the coagulation of the albumen, and the liquefaction of the gelatine, osmazome, and adipose matter. These alterations,

which render it more tender, sapid, and juicy, are mostly produced by exposure to a high temperature; and, therefore, the observation made by Evenus, that fire is the best sauce in the world, is perfectly correct. Cookery has chiefly been made use of to gratify the palate, and it is almost a matter of chance that it has ever been beneficial to the health. This is much to be regretted, because many of the changes produced by it are chemical, and, if properly understood, might no doubt be conducted in a manner that would materially aid digestion: as it is, generally speaking, they are far more likely to impede it.

However much the art of preparing food for daily use may be looked upon as an ignoble occupation, it is really a branch of organic chemistry; and as our knowledge in this department of science increases, the rationale of the modifications effected in food by different culinary processes will, by degrees, be explained, so that they may be conducted upon proper principles. There is no occasion for an ordinary cook to possess all the qualifications

mentioned by Athenæus, and be a mathematician, a theoretical musician, and a natural philosopher, &c., (to which Dr. Kitchener has added, that he should possess a good temper,) any more than that the conductor of a locomotive steam-engine should be a Watt; but it will require the united talents of several great chemists to explain the best manner in which cookery is to be conducted. The only essential now required to be imparted to our food is, that it shall be palatable—the wholesomeness or unwholesomeness of it being rarely inquired into. In former times, probably, this was not so much the case, for the greatest men of antiquity are frequently described as being engaged in cooking their own food; most likely to ensure its being prepared in the fittest way, according to the notions then entertained, for preserving the health. Homer's heroes seem often to have dressed, and even killed, their own victuals. It is mentioned in the Odyssey, that when Achilles entertained Priam he slaughtered a snow-white sheep, which he delivered to his two friends to skin and dress;

and, after it was cooked, he divided it himself among his guests. Many of the most illustrious generals and magistrates among the Romans, during the earlier periods of their history, as Curius, &c., also frequently cooked their own dinners, serving them up in the plainest manner. Most of our knowledge of Roman cookery has been derived from the writings of Apicius. There were three persons of this name, all famous for being *bons-vivans*, and for their skill in cookery. The first lived in the time of Sylla; the second in the time of Augustus and of Tiberius; and the third in the time of Trajan. The second, however, was the most celebrated for his skill in the gastronomic art; being mentioned, on this account, by Seneca, Pliny, Juvenal, and Martial. Athenæus also speaks of the enormous sums he expended to gratify his gluttony, and informs us he was the inventor of several new dishes, and some cakes, which were named after him. Seneca, who was his cotemporary, says that he kept a school of cookery and good eating, in which he squandered away so much money,

that he became deeply involved in debt; and being obliged, in consequence, to look into the state of his affairs, he found, after satisfying his creditors, he should only have about 80,000*l.* remaining; and as he considered it would be complete starvation to try and live upon so small a sum as that, he destroyed himself by poison.

Pliny often mentions the ragouts invented by Apicius, whom he calls "Nepotum omnium altissimus gurges." The cookery of the Romans was probably more refined than our own, for, it is stated, they frequently regaled themselves with the flesh of hawks and young asses; to make which tender and palatable must have required some skill and care. Their cooks were so dexterous, they could serve up a pig or boar, broiled on one side, and roasted on the other. Another favourite way of dressing a boar was that of stuffing it with thrushes, larks, beccaficoes, &c., the whole being steeped in the choicest wines and the richest gravies. This was named the Trojan manner, (in allusion to the Trojan horse, which was filled with

warriors,) and was so expensive, that at one period it was prohibited by a sumptuary law. Any uncommon dish was introduced into the banqueting room with music, generally to the sound of the flute; and the servants were crowned with flowers. Not only was every contrivance had recourse to for the gratification of the palate, but the pleasures of the table were enhanced by rendering everything accessory to eating, as complete as possible. The greatest attention was paid to the manner of carving; and schools were established, at which professors gave instructions to the children of the wealthy patrician families, on the most elegant way of cutting up the different joints, birds, fish, &c. in most repute, by means of wooden models made on purpose.

Juvenal, in his Eleventh Satire, mentions a person named Trypherus, "discipulus Trypheri doctoris," who had acquired great repute for his skill in carving, which art he taught publicly in a school. He had models of all kinds of provisions for a feast, made in wood, on which his scholars exercised themselves with blunt

knives and forks, and made so much noise with their cutting and slashing, that it used to be heard on the other side of the street: "Et totâ sonat ulmea cœna suburrâ." Besides the Apicii, Lucullus, Hortensius, Trimalcion, Fabius Gurges, Messalinus, and Cotta have acquired a sort of immortality by their extreme gluttony; though their feasts were nothing in comparison to those given by Marc Antony, Vitellius, Caligula, Domitian, Commodus, and Heliogabalus. Lucullus went to the greatest expense in his dinners when alone, because then he said that "Lucullus dined with Lucullus."

Cleopatra is stated to have laid Marc Antony a wager that she would give him a feast that should cost more than 40,000*l.*, which he considered to be impossible. During the banquet she took one of the magnificent pearl-earrings she wore, each of which, on account of its size and beauty, was unique, and considered to be worth a small kingdom, threw it into a small vessel of vinegar, and, as soon as it was dissolved, drank it off; upon which Marc An-

tony immediately admitted he was the loser. The feasts of Heliogabalus appear to have been on quite as extravagant a scale as this, the expence of each usually exceeding 40,000*l.* Some single dishes cost 5000*l.* a piece. This is not so extraordinary when their composition is considered, for many of them contained from five to six hundred brains of ostriches, or an enormous number of the tongues of parrots and nightingales. The lanx, or scutella, a large platter covered with different kinds of meat called Mazonomum, was commonly introduced at the Roman feasts.

Vitellius had an immense dish of this description made, which he named the Shield of Minerva: it used to be filled with an incredible variety of the rarest and nicest kinds of meat. This emperor was in the habit of taking breakfast, dinner, and supper at different people's houses on the same day, on each of which occasions it never cost his entertainers less than 400,000 sesterces, or about 3229*l.* 3*s.* 4*d.* a piece. It is calculated that in one year he wasted, in this manner,

7,265,625*l.* In modern times, though extravagance in eating is very great, it has never amounted to anything like this. The chief cause of the entertainments of the Romans costing so much proceeded from so many of their dishes being composed of the tongues, brains, and other small parts of animals, great numbers of which required to be killed before a sufficient quantity of material to make a dish of any size could be procured. Our dishes, on the contrary, being chiefly composed of the larger parts of animals, are necessarily less costly. According to the notions of the present day, the Duke of Newcastle, who used to have thirty or forty legs of mutton cut up, to get a sufficient number of pope's eyes to make one dish, was guilty of unwarrantable extravagance. In our feasts the decorative part, when carried to an extreme degree, and the wines, generally cost more than the materials composing the dishes. The Romans paid great sums for cooks, who were slaves; and, if they became much celebrated in their vocation, always fetched a high

price in the market. In modern times the professors of cookery are liberally rewarded for their services. The principal cook at one of the most celebrated club-houses in London is stated, at one time, to have had a salary of 1500*l.* per annum—a much larger stipend than is enjoyed by any Professor at either of the Universities, and far exceeding the value of the greater number of church livings. Many cooks in the families of our aristocracy have 300*l.* per annum, exclusive of perquisites. The culinary art in this country, therefore, cannot be said to want patronage.

Since cookery has been principally had recourse to for the object of gratifying the taste, it might be concluded that it is of no other use. Indeed many are of opinion that food is not actually rendered more digestible by being cooked, and that it is merely the habit of eating it dressed which causes it to excite disgust in a raw state. Cookery, however, does render food easier of digestion, when properly conducted. The effects produced by it are particularly seen in instances where articles of

diet are eaten raw and cooked alternately. Almost every one is aware that eggs when raw are laxative, but when boiled hard they are apt to produce costiveness. Many plants belonging to the genus Solanum, as the love-apple (Solanum Lycopersicum), or tomato, the egg plant, or aubergine (Solanum Melongena), eaten in France, are injurious or almost poisonous when eaten raw, though by boiling, stewing, or frying their deleterious qualities become corrected. The Solanum Tuberosum, or common potato, is very unwholesome when eaten raw. The nutritious properties of all vegetables abounding in fæcula are greatly increased by cookery; probably because the application of heat causes the grains of the fæculent mass to burst, which enables the juices of the stomach to act on them more easily. Cookery in many instances is important, on account of its exerting a preservative influence on food. In tropical climates the flesh of animals killed in the morning would be in a state of putrefaction before dinner-time the same day, unless it were partially dressed,

and even then it is difficult to preserve it. Many substances not ordinarily eaten, on account of the small quantity of nutriment they contain, are rendered much fitter for food by cookery: thus sawdust can by baking, and boiling, be reduced to an amylaceous pulp, capable of being made into bread, which has been found nutritious. These instances are sufficient to prove that the process of cookery is much more important than is generally considered; for by it the properties of alimentary matter are greatly modified, and therefore the health of individuals is, in a great measure, dependent on the manner in which their food is prepared.

Cold is also employed, as well as heat, for preserving food. Fish, packed in ice, can be sent considerable distances without losing its freshness. Ice, and more particularly snow, are used in warm climates for cooling the ordinary drinks. Great quantities of snow are consumed for this purpose in the south of Italy; and so indispensable is it considered by the inhabitants of Naples to their enjoyment,

that the author has frequently heard it stated, during his residence in that city, that nothing would be more likely to cause a popular commotion than any attempt by the government to increase the tax upon snow, which is already very heavy. Ice and snow were in much request among the ancients; Seneca mentions they were preserved in wells for use in the summer. The introduction of the ice-creams, and water-ices, now sold by the pastrycooks, did not, however, take place till the beginning of the seventeenth century, when they were first invented in France by a person named Procope Couteaux, and afterwards much improved by Le Fevre and Foi, two French confectioners. The invention of Messrs. Appert and Donkin, for preserving food by enclosing it in tin-cases, from which the air is exhausted, has in a great measure superseded the employment of ice for this purpose. This is one of the most important applications of science to the culinary art which has been made in modern times; for there appears to be hardly any limit to the length of time food may be

kept from decomposition in this manner. Sir John Ross, in his account of his second voyage to the Arctic regions, states that he and his companions dined on Christmas-day, 1831, on a round of beef, some veal and vegetables, all in perfect condition, which had been left, with other stores belonging to the 'Fury,' in those high latitudes in 1823; and that other portions of this preserved food, which he brought back to England in 1835, that is eleven years after they were prepared, were just as good then, as when they first went out of the hands of the maker. This discovery, and the subsequent improvements which have been made in it, will be of the greatest importance to the health; not only because it affords the mariner the means of procuring fresh provisions during the whole of the longest voyages, and thereby mainly contributes to rescue him from the frightful maladies to which, formerly, he inevitably became a victim, when the only animal food he could get for months was salted beef and pork; but, as its application becomes more general, it will secure a greater variety

and abundance of food for all people. Many articles of diet, which, on account of their tendency to rapid decomposition, can only be kept fresh in a natural state for a very short period, may, after being prepared by this process, be transmitted from one hemisphere of the globe to the other, in the highest state of preservation. In South America thousands of oxen are slaughtered merely for the sake of the hides, the carcasses being left to rot on the ground as useless. Now that the prohibition on the importation of meat has been removed, a great quantity of this valuable food, which was previously wasted, will no doubt be cured by the new process, and sent to this country, with the greatest advantage to the inhabitants in general. It will likewise enable us to obtain a regular supply, throughout the year, of fruits and vegetables, at a much cheaper rate than by preserving them either in sugar, or pickling them in vinegar. Though the means of preserving food have been much perfected in modern times, it is probable some plan for this purpose was known to the an-

cient Greeks and Romans, who are stated to have been in the habit of conveying different articles of diet, as oysters, &c., to great distances in a fresh state. The principle of the modern process is, as has been previously mentioned, that of excluding the air from the vessel in which the material to be preserved is encased; and when this is done effectually, many facts exist to prove the astonishing length of time animal and vegetable substances may be kept from decomposition. For instance, in 1826, some bottles containing olives and oil were dug out of the ruins of Pompeii; and though the oil was rancid, the olives, as far as their form and colour were concerned, were nearly perfect, having been thus preserved for a period of about 1500 years.

TASTE.

Notwithstanding the enormous number of articles of food by which the taste can be gratified, man varies their flavour to an almost infinite extent by the different combinations he makes of them in cookery. This has been

done in all ages, and the gratification derived from eating seems always to have been one of the chief motives for human exertion. The citizens of London have often been ridiculed, because many of their most important commercial transactions have either commenced, or terminated, with a banquet. This custom is not peculiar to the inhabitants of this country, but is more or less common to all people, ancient as well as modern. To feast any one, amongst the ancient Greeks and Egyptians, was considered an act of the highest respect. Joseph, when prime minister, to confer a greater honour on Benjamin than his brethren, had him served with a five-fold mess; and a double portion was always allotted to the heroes at the feasts of the Greeks. Alexander the Great, before he set out on his expedition to Babylon, offered a public sacrifice to Hercules at Tyre, and at the same time gave a feast to his whole army. Agamemnon is described, in the ninth book of Homer's 'Iliad,' as calling a council at night in his tent. The parties assembled have supper before they

commence business, when they determine on sending an embassy to Achilles. The ambassadors, Ulysses and Diomed, have supper again with Achilles, which consisted chiefly of pork griskins. Achilles rejects Agamemnon's offer, and Ulysses and Diomed set out the same night on their expedition to the Trojan camp, from which they returned before day, when they had a third supper. Animals continually risk their lives, and make the most extraordinary exertions to gratify their desire for food. Hunger has very properly been said to break through stone walls. It predominates so much over reason and moral feeling, that Cardinal de Retz warns politicians never to risk a motion in a popular assembly, however wise or just it may be, immediately before dinner. The violence of the propensity to procure food has been made subservient by nature to cause the removal of dead organised substances, which would otherwise soon become putrid, and, by evolving infectious miasmata, cause disease. Crows, vultures, cranes, &c., are highly esteemed in hot countries, on

account of the important service they render the inhabitants by devouring the carcasses of dead animals. In Egypt great care is taken to afford crows every protection; and some devout Mussulmen have even bequeathed property for the regular support of a certain number of them. Shrimps and prawns found at the mouths of rivers subsist principally upon the putrid animal matter brought down by the stream.

The act of procuring food is likewise of great importance to the vegetable kingdom. Insects, in extracting the saccharine matter found in the nectarium of vegetables, are often the means of applying the pollen to the stigma, thus rendering the impregnation of the flower more certain, particularly in the dicœcious plants, where the male and female organs are in different flowers, or in different plants. Though the propensity to obtain food is so strong in all animals, they by no means eat every kind of alimentary matter they meet with indiscriminately. Even the most voracious possess an instinctive faculty, which en-

ables them to determine whether the food presented to them is fit to eat or not. In the great plague at Athens, 430 A. C., although the unburied corpses of the inhabitants were everywhere lying about, in such positions as death had left them, the beasts and birds of prey did not touch any of them, which shows they perceived their poisonous nature: indeed, it is stated, that at this time most of the vultures and other carnivorous birds quitted the city altogether. Similar facts are recorded of other cities in which the inhabitants have become the victims of any violent epidemic. Animals, from their earliest existence, possess a faculty of distinguishing one kind of food from another. This was well demonstrated by the celebrated experiment of Galen, who procured a kid as soon as it was born, and presented it successively with a vessel of honey, a vessel of oil, and a vessel of milk: the animal refused the honey, and the oil, but immediately partook of the milk. Grazing animals, which have a great variety of herbs offered to them on different pasture-lands, do not feed upon them all

indiscriminately, but select only such as are fit for the use, and proper for the nutrition, of each individually. Thus the ox will not eat any of the labiatæ or the veronicæ; and the horse refuses all the cruciferous plants. Oxen, horses, sheep, and goats, partake of hardly any of the solaneæ, though they are very fond of the gramineæ, the leguminosæ, and the compositæ. The horse refuses the common water-hemlock, which is eaten with avidity by the goat; and the goat avoids the aconite, or bane-berries, for which the horse has a great partiality. The sheep eats the long-leafed water-hemlock, which the cow will not touch.

Man obtains a knowledge of the properties of different kinds of food by experiment, and, too frequently, the taste alone decides him to use many sorts, which he is well aware are of an unwholesome nature. Taste, of all the senses, seems to produce the greatest variety of effect in different individuals; for what is delightful to the palate of one person, is often disgusting to that of another. It is only in this manner that any explanation can be given

of the cause of some most unwholesome articles of diet having always been held in the greatest estimation, even among the most civilized nations. Custom has the greatest influence on taste and diet, for not only do we gradually acquire a liking for many kinds of food which were at first unpleasant, but when they are of an indigestible nature, the stomach may, by perseverance in their use, be brought to digest them.

Animals, it has been proved, can be made to subsist upon quite a different sort of food to that intended for them by nature. Cows, which are herbivorous animals, are often fed upon fish in Norway, during the winter, when no pasture can be procured for them; and in several maritime districts in the East Indies horses are kept on a similar diet. John Hunter has shown that carnivorous birds, as the hawk, &c., may be gradually brought to digest grain; and Spallanzani found that the eagle can live on bread, and the pigeon on flesh. In the human race, the peculiar dishes or articles of diet used by one class of people are at first

indigestible to another class, until gradually accustomed to them. Thus the food which the American finds beneficial would often be prejudicial to the Asiatic; and what the Asiatic can digest easily would be rejected by the stomach of the European. A great many substances, the taste of which is at first disagreeable, become so captivating from habit that they cannot be dispensed with. This is the case with tobacco, the use of which, in the period of about three centuries, has gradually become general amongst all nations, notwithstanding it does not possess any nutritious properties, and that its flavour is particularly nauseous to persons unaccustomed to it. That a taste may be acquired by habit for almost anything, and the most disgusting substances relished as food, is proved by the great variety, and by the parts, of animals eaten by mankind. It is unfair to reproach savage tribes with their diet, for nothing can be more revolting than many articles of food eaten by the most civilized nations. The trail, which is in fact the intestine of the woodcock, is considered a great

delicacy by epicures, and the dregs which drop from it whilst roasting are most carefully collected, and eaten with the greatest relish: the intestines of the buzzard are also held in high estimation: the diseased liver of the goose, a most unwholesome substance, is a very expensive and much-prized article of diet in France and Germany, forming the celebrated entremêt named 'foie gras:' it was also in great request among the ancient Romans. This latter people were particularly famous for eating substances not at all fit for food. They paid an exorbitant price for a celebrated sauce called garum, which was prepared from the putrid intestines of the thunny, mackerel, &c., mixed with vinegar, hot wine, salt, and spices. "Nobile nunc sitio luxuriosa garum."—(*Martial*, Epigr. I., xiii., v. 28.) A somewhat similar mixture, said to be prepared from the putrid intestines of the crab, is used at present at Tonkin. Many dishes were served up at the tables of the Romans which we should not be able to touch. Sausages made of sow's liver, chopped up with fat and various herbs, accom-

panied with a sauce of milk, or dormice smeared with honey, and sprinkled with poppy juice, would probably not be much relished at our dinners. The altilia sumena, considered a great delicacy, was composed of the gravid uterus of swine. Lucian and Petronius Arbiter both speak of a sow's matrix being often served up with fried liver. Dishes made of the brains of ostriches and parrots, and of the tongues of nightingales and flamingoes, were much sought after. Indeed, in the period of their wealth and degeneracy, the Romans ransacked the world for substances to gratify their love of eating. "Vescendi causa terra marique omnia exquirere."—(*Sall.*) "Gustus elementa per omnia querunt."—(*Juv.*) Probably no people ever carried their gluttony so far as they did. At their feasts they used to remain at table till they could not eat another morsel: they would then retire into the antechambers belonging to the dining apartments, where basins were ready prepared, and take an emetic; and after the stomach was emptied by its operation, they resumed their seats at the dinner-table, to con-

tinue their repasts. "Vomunt ut edant, edunt ut vomant."—(*Sen.*)

The pleasure man derives from eating is so great, that no expense is spared for the gratification of the appetite; and in the present day our tables are covered with productions from every quarter of the globe. Mahomet was too well aware of the esteem we have for the pleasures of the table not to make them form one portion of the rewards allotted to the Faithful in his Paradise. Sale, in his preface to the Koran, says, "He taught his proselytes, that for the first entertainment of the blessed on their admission into Paradise the whole earth would appear as one loaf of bread, which the Creator would reach to them with his hand, holding it out like a cake. That for meat they would have the ox Balam, and the fish Nun, the lobes of whose liver alone will suffice seventy thousand men, being, as some imagine, to set before the principal guests, viz., those who to that number will be admitted into Paradise without examination; though others suppose that a definite number is here put for

an indefinite, and that nothing more is meant thereby than to express a great multitude of people. From this feast every one will be dismissed to the mansion designed for him, where he will enjoy such a share of felicity as will be proportioned to his merits, but vastly exceed comprehension or expectation, since the very meanest in Paradise will have eighty thousand servants, seventy-two wives of the damsels of Paradise, besides the wives he had in this world, and a tent erected for him, of pearls, jacinths, and emeralds, of a very large extent; and, according to another tradition, will be waited on by three hundred attendants while he eats, will be served in dishes of gold, whereof three hundred shall be set before him at once, containing each a different kind of food, the last morsel of which will be as grateful as the first: he will also be supplied with as many sorts of liquor in vessels of the same metal; and, to complete the entertainment, there will be no want of wine, which, though forbidden in this life, will yet be freely allowed to be drunk in the

next, and without danger, since the wine of Paradise will not intoxicate, as does that we drink here. The flavour of this wine we may conceive to be delicious, without a description, since the water of Tansim, and the other fountains which will be used to dilute it, is said to be wonderfully sweet and fragrant. If any object to these pleasures, as an impudent Jew did to Mahomet, that so much eating and drinking must necessarily require corresponding depletion, we answer, as the prophet did, that the inhabitants of Paradise will not need anything of the kind, for that all superfluities will be discharged and carried off by perspiration as odoriferous as musk, after which their appetite shall return afresh."

The pleasure of eating is just as great in the inferior animals as in man. The quiet ruminants pass their lives in doing nothing else. If a large animal dies, multitudes of every class hasten to the spot to feast upon its body; which is generally first attacked by carnivorous quadrupeds, or by birds of prey, and if they do not speedily devour it, swarms of insects appear, which very shortly consume its softer textures,

leaving only the bones. In some countries even these afford sustenance to the hyena and other animals, whose powerful jaws are so well adapted to grind them to powder, after which the digestive organs can easily extract from them the great quantity of nutritious matter they contain. To give some idea of the rapid consumption of animal matter by carnivorous insects the opinion of Linnæus should be quoted, who has affirmed that the carcass of a horse would not be devoured with the same celerity by a lion as it would be by three flesh-flies (Musca vomitoria) and their immediate progeny. Incredible as this may appear at first, it will seem less so when it is known that one flesh-fly will give birth to at least 20,000 young larvæ, each of which will, in the course of a day, devour so much food, and grow so rapidly, as to acquire in that short space of time an increase of two hundred times its own weight, and a few days are sufficient for the production of a third generation.

EFFECTS OF ANIMAL FOOD.

Animal food alone is not a desirable diet for

man, on account of its stimulating effects on the body. It is more nutritious than vegetable food; and, used with discretion, causes a more complete development of the body to take place, and, consequently, increases the energies of the different functions. It has the effect of increasing the quantity of fibrin in the blood, and favouring the growth of the muscular system: hence a liberal allowance is proper for persons training themselves for the performance of feats of strength, as prize-fighting, walking long distances, &c. It is not by any means advantageous when made the exclusive article of diet, as is shown by the condition of the almost purely carnivorous inhabitants of the earth, viz., the Esquimaux, Kamtschadales, Ostiaks, Samoieds, the inhabitants of parts of the coast of New South Wales, of some of the South Sea Islands, the Ichthyophagi on the banks of some of the rivers in Africa, &c. These people are amongst the lowest, in every respect, in the great family of human nature: they possess no qualities, either corporeal or mental, which tend in the least to show

that their diet is favourable to the health and development of the human frame. On the contrary, the short duration of their lives, the numerous diseases to which they are liable, and the inferiority of their mental acquirements, all go far to prove that animal food alone is much more prejudicial to man than an almost exclusive vegetable diet.

It must not be imagined, from what has just been stated, that animal food is considered to be disadvantageous when taken in proper quantities: on the contrary, in moderation it is most beneficial; and, no doubt, a perfectly natural nutrition of the body cannot be obtained without it. The importance of its effects are proved by the peculiar conditions manifested by the carnivora which are intended to live on it exclusively. These animals, generally speaking, can support hunger for a much longer period than the herbivora: the lion, the marten, and the wolf frequently go without food for fifteen days, and yet, instead of showing signs of loss of strength and energy, they become more daring and ferocious; but if

the horse, ox, and sheep are deprived of food only for three days, they are completely exhausted; and yet most of the herbivora are always eating, whilst the carnivora only take food at long intervals.

EFFECTS OF VEGETABLE FOOD.

Vegetable food renders the blood lighter, and is less stimulating than animal food, which is the reason of its being preferred in hot countries. It affords the principal means of subsistence to the greater part of the population of the earth; though, when taken quite alone, it does not appear to be capable of effecting the perfect nutrition of the body, and therefore it must be considered inferior to animal food. The simpler the composition of vegetable food, the less it is capable of affording nourishment; and many animals die of starvation when fed only with animal or vegetable substances which contain no azote.

Dr. Stark died for want of nourishment, from limiting his diet to bread, butter, suet, sugar, olive-oil, and water. Clouet lived for one

month on nothing but potatoes and water, by which he was reduced to such a weak state that he was compelled to have recourse to more nutritious food. Magendie found that dogs fed only with sugar and distilled water died of starvation in from thirty to sixty-three days. Tiedemann and Gmelin treated geese in the same way, and found them die in from sixteen to twenty-seven days. One goose, weighing six pounds and an ounce, was fed on white sugar, and died in twenty-two days, having diminished one pound nine ounces in weight. A goose, weighing five pounds ten ounces, was fed with nothing but gum-arabic and water, and died in sixteen days, when it weighed only four pounds ten ounces. Another goose, weighing eight pounds and a half, fed with starch only, died in twenty-seven days, when it weighed only six pounds and one quarter. A sheep, which weighed fifty-two pounds, had nothing given to it daily but from six to ten ounces of sugar dissolved in water: after twenty-two days it died, being greatly emaciated, and weighing only thirty-one pounds. In opposition to the results

of these experiments, it has been stated that a caravan of Abyssinians, consisting of nearly two thousand persons, who had lost their way in the desert, and had consumed all their provisions, subsisted for about two months on nothing but the gum-arabic they found amongst their merchandise. Probably, however, there is a little incorrectness in this account, for these people had a good many camels with them, and no doubt they also partook of the milk of these animals, which is a very compound sort of food. It is astonishing what a small quantity of animal food is requisite to render vegetable food exceedingly nutritious. No people in Europe are stronger, or more robust, than the Irish, the Swiss, and the Gascons, whose diet consists chiefly of potatoes, bread, cheese, and buttermilk. Of the thirty-five millions of people in France, more than twenty-five subsist almost entirely on vegetable food; and in Spain, Portugal, and all the south of Europe, the number of persons who live chiefly on vegetables is in about the same proportion. The labourers on the coast of Africa, who go from tribe to tribe

to perform the manual labour, are stated to live almost solely on plain rice, and yet they are remarkable for their great muscular strength. The Arabs on the shores of the Red Sea, who subsist mostly on lemons and dates, are able to carry loads of enormous weight. The Brahmins in India, the inhabitants of the Canary Islands, and of the Brazils, live almost entirely on vegetable food. The negroes, whose bodily strength is well known, feed chiefly on vegetable substances; and the diet of many of the South Sea Islanders is similar, though their agility and strength are so great, that the stoutest and most active of our sailors had no chance with them in boxing and wrestling. These latter people do not, however, possess the same power of enduring exertion as the English; for in boat races for some distance, though they shot far a-head at the outset, our sailors always overtook them, and ultimately came in first.

MIXED DIET.

After having examined the effects of animal and vegetable food upon the body, when taken

separately, it will be right to pass to the consideration of the results produced by diet of a mixture of those two great classes of alimentary substances. The most conclusive evidence exists to prove that the tribes of men who do not limit themselves particularly either to animal or vegetable food, but partake of both, are those in whom the function of nutrition is most perfectly performed. Every organ or tissue is found in them in the most perfect state in which it has been known to exist. Hence their superiority in every respect over their fellow-creatures, whether it be corporeally, mentally, in energy of character, in their exemption from disease, or in the duration of their lives. Imperfect as human nature is, man is found in the most perfect state among these people; and when all the circumstances connected with this question are taken into consideration, it is not extraordinary that it should be so. The account before given of the great variety of food taken by man has not been brought forward merely to excite an idle feeling of astonishment, but to show how bountifully the

Creator has provided for his subsistence. The different articles of diet partaken of by the human race, and which are capable of affording nourishment, amount to nearly four thousand in number, all produced in such abundance, that the destruction of mankind by famine would appear to be impossible. The extraordinary assimilating powers of the body render it capable of being nourished by matter of the same description as itself: so that man, in the last extremity of destitution, can derive sustenance from feeding on his fellow-creatures. This striking capacity for obtaining nourishment from such a large portion of the substances composing the universe may be cited as one proof that the food of man was intended by nature to be of the most varied description. Next, the peculiar structure of his organs of digestion affords another argument in favour of this opinion. His teeth present a combination of the peculiarities offered by those of animals destined to live exclusively either on animal or vegetable substances: some of them having sharp cutting edges, like those of the

carnivora, for tearing and biting; and others presenting broad irregular surfaces, like thoes of the herbivora, well adapted for grinding and comminuting. The human stomach is not so simple as that in the true carnivora, nor so complicated as that in the herbivora, but holds a medium position between the two. The intestinal tube in the human frame averages six times the length of the body, whereas in the carnivora it is not more than once or twice its length, and in the herbivora it is sometimes as much as thirty times as long. Man also is capable of deriving nourishment from a much greater number of different substances than any other animal. It is impossible, after considering these facts, not to feel satisfied that Nature intended the human race to partake of a great variety of diet, and that, in fact, man may be said to be an omnivorous animal. Diversity of food should be considered as the first requisite for the full development of the system; and no doubt nutrition will be more complete in proportion as the variety of the articles of food to be selected from,

with discretion, is increased. The means of obtaining a variety of food have gone on increasing, *pari passu*, with the civilization and intelligence of the human race. The gradual manner in which a regular communication between so many parts of the world has been brought about has enabled different nations to make an interchange of their most important articles of food: the result of which is, that a greater quantity of wholesome nourishment in general is produced at this time on the earth, than at any former period within the memory of man; though unfortunately it is far from being sufficient for the exigencies of the human race, nor can it probably be rendered so without the greatest exertions continued for ages. Europeans may justly lay claim to the merit of having been most instrumental in conveying the different animals and vegetables most useful as articles of diet from one country to another. From Europe and Asia they have carried our common ruminants, and fowls, corn, sugar, rice, tamarinds, tea, coffee, some spices, oranges, and many other vegetables, to America and

Australasia. They have brought back from America, in return, the turkey, maize, potatoes, manihot, the pine-apple, &c., and transported them to different regions in Europe, Asia, Africa, and Australasia, where the climate and soil are fitted for their existence and growth. They have thus conferred a great benefit on the human race in general; for the more completely this interchange is carried out, the more will the means for nourishing the body be multiplied, which is the best way to improve its condition.

Many persons entertain a very different opinion on this subject, and consider that the human race has degenerated, and that diseases have become more numerous and fatal, since the variety of our food has been so much increased. Some authors state in their writings, that the ancient Greeks and Romans were mainly indebted, for their superiority over their cotemporaries, to their frugal manner of living, and to the little variety of diet they enjoyed; for they had neither brandy, liqueurs, tea, coffee, chocolate, sugar, butter,

nor any of the numerous articles of food used at present in Europe, which have been introduced, or are imported, from Asia and America. Allowing that some of the greatest ornaments of the human race have emanated from among these people, the mass of the population were not at all in an analogous state of advancement, but, on the contrary, were in a very abject condition both of mind and body, existing for the most part in a state of slavery. The average length of life was shorter amongst them than amongst us, and they were affected with many diseases more dreadful than anything of the kind known in modern times, as many forms of leprosy, &c., which must be principally attributed to defective nutrition of the body. After these observations, it is almost needless to offer any remarks about the mistake made by those persons who fancy that because our ancestors of some six or seven hundred years ago did not possess the means we have of varying our diet, they were superior in corporal development to ourselves. One trivial circumstance may be mentioned

to prove the incorrectness of such an opinion. At the time of the tournament lately given by the Earl of Eglintoun, at his seat in Scotland, when the old armour of so many departed Templars was brought out, for the use of the knights who were to figure at that entertainment, many periodical publications teemed with paragraphs asserting that a great deal of padding and filling up was necessary, to enable our young but degenerate aristocracy, as they were called, to keep on the corselets, arm-pieces and sheaves, on account of the gigantic stature of the persons for whom they had originally been made. Mr. Pratt of Bond Street, who provided a large portion of this armour, states the very reverse to have been the case; that the reason, in almost every instance, the old armour had to be altered was, that it was too small, instead of being too large. Most of the cuirasses, and the coverings for the limbs, were found to be so tight across the chest, and round the arms and legs, that they could not be worn, and scarcely any of the helmets could be got on before they were en-

larged: most satisfactorily proving that the higher orders of young men of the present day, in this country, possess a more perfect corporeal development than those of a similar class had six or seven hundred years ago.

In consequence of the very debased state of those nations who live exclusively on animal food, it is impossible accurately to determine what the kinds of animal substances are which, when eaten alone, have the most beneficial effects in aiding nutrition. This is not the case with vegetable food, for the great difference in the condition of those nations who subsist chiefly on this kind of diet shows that some vegetables are much more efficient than others for nourishing the body. By comparing the different nations one with another who subsist principally upon vegetable matter, it will be found that the European, who lives chiefly on wheat and the other cerealea, is far in advance of the Brahmin, who lives on rice or millet; of the Chinese, who lives on rice; or of the Mexican, who lives on maize; and therefore it is fair to conclude, that, of all

these kinds of grain, the cerealea are best fitted for the health and development of the body. If the state of the human frame be a fair criterion by which a correct opinion may be formed of the influence of food, there is no difficulty in ascertaining what kinds of animal substances, taken in conjunction with vegetables, are most advantageous. The most advanced nations on the earth, who present to us the highest combination of the faculties, which dignify human nature; who offer instances of the greatest energy of character; who in the aggregate have most power of resisting diseases; and who offer, on the average, examples of the longest duration of life, are those who subsist on food chiefly derived from the cerealea, and our common ruminants. And there can be no question that if these people could command a more ample supply of these kinds of food than they can at present, they would manifest the superior attributes they already possess, in a still greater degree of perfection. They are descended from that division of mankind which has been de-

signated the Caucasian race, who are supposed by many to be indebted for their superiority over the other races to being endowed with a better natural organization, and to their having originally inhabited a temperate region of the earth. The great probability that these circumstances have had a marked influence on their condition cannot be denied; but at the same time it ought to be remembered that the parts of the world from which this race has sprung, the west of Asia, is exactly that to which all the kinds of vegetable and animal food are indigenous which seem best fitted for effecting the development of the body. Many other countries have equally temperate and salubrious climates: so these are advantages which have not been enjoyed by the Caucasian race alone; and allowing them to possess a superior natural organization, the probability must still be admitted, that they are also in a great measure indebted for their advancement before their fellow-men to their having had their origin in the region of the earth which naturally produces the

most excellent kinds of nutritious matter. The Land of Promise of the Scriptures has furnished more of the best sorts of food, both animal and vegetable, than any other part of the globe.

INFLUENCE OF PARTICULAR KINDS OF DIET.

Having established that a mixed diet is most natural and beneficial to man, the modifications which can be effected in living beings, by furnishing them with peculiar kinds of nutritious matter, will next be investigated. The great variety of alimentary matter that exists, possessing properties which produce the most opposite effects, holds out a prospect of our being able to improve, to an unprecedented extent, all beings whose nutrition can be brought under our control; and it is reasonable to anticipate, that as our knowledge of the properties of different kinds of food, and of their combinations, increases, changes may be effected in the human frame, which will cause it to enjoy greater immunity from disease, and prolong the period of its existence. Such results will be more completely brought about

by the improvement of the condition of those living beings which serve as food; for the more perfect development of the body is conditional upon the excellence of the matter by which it is nourished. Man has it in his power, by directing his attention to the nourishment of the beings upon which he subsists, whether vegetables or animals, to cause quite as important alterations in them, as he can in his own body by adopting a similar course. Nothing exhibits more strikingly how much living beings can be improved, by subjection to careful plans for nutrition, than an inquiry, first of all, into some of the alterations which different kinds of cultivation have produced in many vegetables used as food. Those from which the human race procure the greater proportion of their subsistence appear to have been very different in their natural state to what they are now, when they furnished much less nutritious matter than they do at present.

The original plant from which wheat was produced is not known, and many botanists suppose that continued cultivation for ages,

has so modified it, that it cannot now be distinguished.

Rice, rye, barley, and oats have not yet been found growing in a wild state, so we are unacquainted with the plants from which they have originated. This will appear less extraordinary, when the alterations which have occurred in other vegetables are considered. The almond, with its tough coriaceous husk, has been changed by long culture into the peach, with its beautiful soft and delicious pulp; the acrid sloe, into the luscious plum; and the harsh, bitter crab, into the golden pippin. Attention to nutrition has produced quite as marked changes in the pear, cherry, and other fruit-trees, many of which have not only been altered in their qualities and appearance, but even in their habits. Celery, so agreeable to most palates, is a modification of the apium graveolens, the taste of which is so acrid and bitter that it cannot be eaten. Our cauliflowers and cabbages, which weigh many pounds, are largely developed coleworts that grow wild on the sea-

shore, and do not weigh more than half an ounce each. The rose has been produced by cultivation from the common wild-briar. Many plants may be modified with advantage, by suppressing the growth of one part, which causes increased development of other parts. Some propagated by slips for a long series of generations, lose their seeds by obliteration, and then they can be propagated by slips only: in these instances, the nutritious matter for the growth of the seeds is often attracted by the roots, which become inordinately developed. This is the case with the common potato, the root of which has increased in magnitude, at the expense of the fruit or apples, which have diminished in size. All these changes in vegetables have been produced by pruning, transplanting, grafting, by supplying them with a variety of soils and manures, and by exposing them to different degrees of temperature and quantities of light; in fact, by regulating their nutrition.

It may be remarked that particular plans of nutrition produce such striking effects in vege-

tables, because they are more under control than animals; but when animals are subjected to similar influences, analogous results are obtained. By attending to the food, exercise, and breeding of horses, this country can boast of the finest race of those animals in the world. Our farmers have contrived, by directing their attention to the nutrition of sheep, to obtain a breed which affords a combination of the least bone, most meat, and the finest wool. By particular plans of diet, they can cause a deposition of fatty matter to take place in oxen, sheep, pigs, &c., to an enormous extent; and though agricultural societies award prizes for the fattest of these animals, the advantages of bringing them into this state, if they are to serve as food, must be very questionable to the physician, except as an experiment to prove the influence which peculiar plans of diet have on animals.

Geese, when overfed, and deprived of exercise, become affected with a sort of hepatic cachexy, which is the way the 'foie-gras,' so much esteemed in France, is obtained. A lean goose

is selected, and confined in a deal box, which is so small that the bird cannot turn in it: the bottom is provided with a wide grating of rods for the passage of the dung. A hole is made in the fore part of this box for the head of the bird, under which a vessel is placed full of water, with some pieces of charcoal in it, to keep it fresh. The bird is placed in this state in a cellar, or other dark place, no doubt to prevent all distraction, and concentrate all the powers of the constitution on the digestive organs: it is even said the creature's eyes are sometimes put out, to render it more inactive. The food employed is maize soaked in water, considerable quantities of which are crammed down the bird's throat morning and evening, and the rest of the day it remains constantly drinking and guggling the water placed before it. About the twenty-second day some poppy oil is mixed with the maize, and by the end of the month the fattening process is usually completed. This is indicated by the difficulty the bird has in breathing, and by the presence of a lump of fat under each wing. It

is now necessary to kill it, or otherwise it would die of fat. Some idea may be formed of the state of obesity produced, when it is stated that the liver of a goose, treated in this manner, often weighs from one to two pounds, and that the body, which is considered excellent eating, furnishes while roasting from three to five pounds of fat.

The flesh of male animals deprived of their procreating powers acquires a more delicate flavour, and therefore is more esteemed, as in the capon and in wether mutton. All particular articles of food produce marked effects on animals. Sheep accustomed to browse on hills or mountain lands, where the pasture abounds in roots, afford mutton of a much finer flavour than those fed on plains. The fat of fowls which have been fed on garlic acquires the flavour of that substance, and the flesh of birds which eat fish has a fishy taste. A striking difference is observed in the secretions and excretions of animals, according as they are fed on animal or vegetable food. They are very different in the dog when fed alternately, for

days or weeks, on bread or meat alone. The urinary calculi, in vegetable-feeding animals, are always composed of carbonate of lime, though calculi of phosphate of lime are met with in the digestive tube; whilst in man and the carnivorous animals, the urinary calculi are chiefly composed of phosphate of lime. Urea and the gouty chalky secretions are very abundant in men and animals which partake largely of animal food. Naturalists inform us, the larva of the queen bee is nourished with a peculiar kind of food, which is the reason this insect has a different organization from that of the other bees. The cause of these singular effects occurring in living beings is to be referred to the remarkable properties the different organs possess of appropriating to themselves different elements contained in the food. In this way food may be made to perform the part of medicine, and produce the most striking alterations in the body. Many articles of diet act apparently in a similar manner to those medicinal substances which have a specific influence on some particular tissue or class of

organs. Some drugs particularly affect the skin, as antimony, sulphur, &c.; others the kidneys, as turpentine, which communicates an odour of violets to their secretion; or rhubarb, which has been observed to pass from the stomach to the fluid separated by the kidneys in a few minutes. The ergot of rye induces contractions of the gravid uterus; an effect not produced to the same extent, or with the same rapidity, by any other substance. Digitalis, or fox-glove, has the effect of causing the contractions of the heart to be slower, weaker, and a general depression of the powers of the circulating system. Calomel and iodine act powerfully on the glands and absorbents. Alcohol has a special influence on the brain and nervous system. The cause of each of these different medicines affecting some particular part of the body, and not the whole of it, proceeds from their being of a nature which allows of their passing more readily from the blood, or circulating fluid, into the intimate structure of one part of the system than into another. This law obtains just as much for food

as it does for medicines, and therefore food may frequently be made to supply the place of medicine, though the latter cannot be made to supply the place of the former. Medicines unquestionably, for the most part, produce more rapid changes in the body than food, on which account they are indispensable in acute diseases, which would cause death if not quickly arrested in their progress; but some of the most fatal maladies to which the human frame is liable are as much under the control of diet as of medicine. The remedies employed in incipient phthisis, or consumption, are in a great measure rendered efficacious or otherwise, by the plan laid down for the diet of the patient. The quantity of fibrin in the blood can only be increased or diminished by means of the kind of food which is taken. For this reason, a liberal allowance of animal food has sometimes the greatest influence in checking a tendency to the formation of tubercles in the lungs; though in other cases where a similar affection is to be apprehended, if inflammatory action appear likely to ensue, it ought only to be

taken in very moderate quantities. Phthisical patients, whose stomachs will bear a good deal of milk, often find the nutritious effects of that fluid greatly increased by taking chalybeates with it, the medicine and the food seeming to assist one another, in producing a beneficial influence on the body.

A costive habit of body, which is the immediate cause of two-thirds of the illnesses that affect the middling and upper classes in this country, may very frequently be remedied by remodelling the whole plan of diet. In most of these cases recourse is usually had at last to violent medicines, which by their operation exhaust the vital powers of the system; though if the manner of living were regulated by a few simple rules, there would be no occasion to take violent medicines at all. The reason steel medicines are so beneficial to females affected with chlorosis, or green-sickness, is explained by its having been ascertained that in this complaint there is a deficiency of iron in the blood. Dr. Rollo found that when persons affected with diabetes mellitus, a disease characterised by the

sweetness of the urinary secretion, live entirely on animal food, and particularly fat, thereby avoiding all articles of diet which contain sugar, or the principles of sugar, the urine very frequently loses its sweetness entirely. He therefore recommended a regimen of animal substances as a cure for this complaint; but, unfortunately, as soon as the patient returns to the use of a mixture of animal and vegetable food, the sweetness of the urine returns again, and the disease generally proves fatal. At the same time the change produced upon the urine in these cases proves the influence particular plans of diet have on the health.

By high living, or the use of a great quantity of animal food, an excess of azote is introduced into the system, which causes the formation of small calculi in the kidneys, that are termed gravel. These substances are principally composed of uric acid, a highly azotized substance, and their production appears to afford the system a means of getting rid of a part of the superabundance of the azote it contains. The influence diet has on this complaint

is well illustrated by the following case observed and described by M. Magendie:—

"A Hanseatic merchant, who had for many years indulged himself a good deal with high living, became affected with gravel. He continued to keep an excellent table up to the year 1814, when, his affairs becoming embarrassed, he emigrated to England, where he lived very miserably; but his complaint left him. In a short time, however, he re-established his business, which enabled him to return to his former plan of life; when he soon found his disease return. He was ruined a second time; and, being in an almost destitute state, went to France, where he soon became exempt from his usual affection. But, such is the elasticity of commerce, that by industry he finally succeeded in acquiring a competency, which once more led him to resume his former habits, and again he found himself a martyr to his old complaint. Under these circumstances he applied to M. Magendie for professional advice."

Food containing great quantities either of hydrogen or oxygen gases produces very im-

portant effects on the system. Hydrogenous food, such as fat meat, butter, oil, and particularly alcoholic liquors, causes a great change in the chemical constitution of the body, which induces bilious affections, and a tendency to unwholesome fatness. Spirituous liquors appear to be the cause of what is termed spontaneous combustion of the body, which has usually been observed to occur in elderly females addicted to dram-drinking. They seem to produce such an excessive hydrogenation of the body, that it becomes charged with nearly as much hydrogen gas as is contained in a piece of common coal, which renders it very liable to ignition. The bodies of persons in this state often become lighted whilst they are dozing before the fire: at first the clothes get ignited, when the combustion soon extends to the body itself, which is said to burn with a slow blue flame; though it has never been found completely incinerated, some parts always remaining only half burnt, whilst others are entirely consumed. Changes equally marked are produced in the body by food charged with oxygen

gas. Acids, which contain a considerable quantity of oxygen, usually excite the action of the absorbents, and cause leanness. On the other hand, the want of food containing oxygen, joined probably to deficient means for nourishment in general, seems to be the cause of sea-scurvy. The influence of diet either in inducing, preventing, or curing disease cannot be more strikingly illustrated than by making a comparison between the accounts left us by officers of the navy a century ago, of the ravages made at that period by scurvy among sailors, and those now published of the health of the crews of her Majesty's ships.

With the exception of a few instances among the officers and men employed in exploring the polar regions, the British fleet may be said to have been quite exempt from this horrible malady since the time of Captain Cook; previously to that date, any one who ventured to undertake a long sea voyage must have had every reason to anticipate it would be fatal to him. After being a few months at sea, scurvy always made its appearance; and in a moderate ship's

company eight or ten deaths usually occurred daily; whilst the rest of the crew became so dispirited and debilitated by this complaint, that they had hardly strength left to throw the dead bodies of their companions into the sea, which are therefore described as being often left washing about the decks, after they had been sewn up in hammocks. To show that the above is by no means an exaggerated account, it is stated that Admiral Hosier, who sailed from England in 1726, with seven ships of the line, to the West Indies, buried the whole of his ships' companies twice, and died himself afterwards of a broken heart. At present, however, this disease is so rare in our ships, that most of the naval surgeons of the present day can never have had an opportunity of seeing it at all. This is proved to be the case by the returns from the great naval hospital at Haslar; for the number of cases of scurvy admitted into that establishment, in the year 1780, was 1457, whilst in 1806 and 1807 only one case was admitted each year; and now instances of it are very seldom met with.

The eradication of this disease, for that is not too strong a term to use on this occasion, has been effected by the employment of preventives and remedies which are purely dietetic; and consist in giving our ships' companies as liberal a supply of fresh vegetables as possible, with preserved fruits, sugar, infusion of malt, spruce beer, and vinegar; but particularly of regular allowances of lemon-juice, prepared in a concentrated state expressly for the purpose; which, by a general order of the Admiralty, is given to the men in the presence of some of the officers, to insure its being taken. Now of all these articles the most efficient in counteracting this disease are those which contain an excess of oxygen; a fact greatly in favour of the theory which attributes this complaint to a deficiency of oxygen in the system.

The foregoing remarks are quite sufficient to show the remarkable effects particular kinds of diet cause in some cases; but it is difficult, on account of the magnitude of the subject, unless some particular change is to be produced in the system, to give specific rules for diet in general.

It usually happens also, that each constitution has its peculiarity, which requires to be attended to. The great object is to comply as much as possible with the intentions of nature. 1st. A liberal but not excessive quantity of food should be taken daily. 2ndly. The food ought to consist of a mixture of animal and vegetable substances; because the digestive organs of the human body are constructed for the digestion of both these kinds of aliment. 3rdly. The food should be varied from day to day. Every person, in order to maintain the full vigour of his body, ought to partake of an ample quantity of food of a good quality daily, conditions which unfortunately belong to the diet of a very small fraction of the inhabitants of the earth. The young and the aged require most nourishment proportionately; the former to allow of the building up of the body, the latter to obtain sufficient stimulus to the system when its powers are beginning to fail. In both these instances digestion is performed more rapidly than at other periods of life, and therefore the intervals between the different

meals should be short, though care must be taken to prevent their being repeated so often as to cause the stomach to be overloaded.

For persons of weak stomach, animal is more digestible than vegetable food. At the same time a great excess of animal food is unwholesome: people therefore with a good digestion, who make hearty meals, ought to eat a considerable quantity of vegetable matter, for if they were to satisfy their hunger with animal food alone, they would take more of it than is desirable. Those who have a poor appetite should allow themselves more animal food, in proportion, than vegetable. The French plan of eating enormous quantities of bread at dinner is unwholesome for most people, unless they take very violent exercise; a very liberal allowance of bread is always apt to induce head-ache, and a confined state of the bowels. A great many disorders of the digestive organs result from not knowing how to regulate the proportions of animal and vegetable food which should be taken. Children, in consequence of the keenness of their appe-

tites, require a good deal of food; and therefore, if fed principally on animal substances, they would eat too much of them, and grossness of body would be induced. Dieticians often exclaim against the practice of giving children pies and puddings, which they consider are invariably unwholesome. This is a mistake: if a child is in a very robust state of health, and can easily digest moderate quantities of those articles of diet, they are very proper for him, because they prevent his eating too much meat; and it is clear that whenever a very large quantity of food is taken, Nature intended that it should not be of too concentrated a description. The great mischief produced by pies and puddings proceeds from their being given, because they are considered light food, to children whose digestive powers are weak; and in these cases they give rise to all the bad consequences of indigestion. The best plan for restoring the powers of the digestive organs in weakly children is to give them a liberal allowance of animal food, and prevent their having much vegetable matter. Almost all

children amongst the middling classes of society, who pass several hours of the day in study, should have meat once a day; and many of them require it twice a day, and but little vegetable matter. Children who are not allowed a sufficient quantity of animal food are very apt to exhibit a low state of vitality, which is favourable to the production of parasitic growths, whether animal or vegetable, on different parts of the body. They are therefore particularly subject to many cutaneous affections, which are produced by animalculæ and fungi, that make their appearance on the skin and cause it to be diseased. The common psora results from the irritation produced by an animalcule which burrows in the skin. The infrequency of this disorder among the wealthier classes of society is quite as much to be attributed to the liberal diet they enjoy, as to the attention paid to preserve the cleanliness of their bodies. The boys at Christ's Hospital are very liable to scald-head, and many other cutaneous diseases: in fact, the former is hardly ever out of the school. These

complaints result in a great measure from imperfect nutrition, as the children are not allowed a sufficiency of animal food. Nothing can be more objectionable than that in this excellent establishment, with its enormous funds, there should be kept up the system of banyan-days, as they are called, on which the boys do not get any meat at all, and very often nothing but bread and butter. No doubt this abstemious plan is followed, because it is considered healthy. But this opinion is most erroneous; for there is little doubt if the boys had a more liberal animal diet allotted to them, and if great care were taken that all the articles of food given them should be of the best quality, most of the cutaneous diseases with which these children are so frequently tormented would soon disappear, and they would be altogether less likely to be attacked by illnesses than they are at present.

The rules for diet usually laid down do not inform people what they ought to eat, but rather recommend them to abstain from food as much as possible, on which account great

abstinence is generally recommended as most likely to ensure health. This is all very well, when people take too much food, and temperance in living is, no doubt, of the greatest consequence, but the stomach was not furnished to the human body in order that as little use as possible should be made of it: the real object is to ascertain how it may be employed to be of the greatest service to the health. Full vigour of system can never be produced by starvation; it can only be obtained by a sufficient supply of materials, capable of completely developing the different organs of the body, and keeping them in repair. The instance of Cornaro, who improved his health so much by great frugality of diet, is therefore frequently most improperly quoted; for though the plan of living he followed might suit some persons, it would infallibly cause disease, and ultimately death, if rigorously adopted by most people. The account he has left of the small quantities of food he was in the habit of subsisting on is alone sufficient to show how injurious the majority of individuals would find an at-

tempt to live in a similar manner. He tells us, that he was extremely unhealthy and decrepid up to the age of forty, when he determined on adopting a most abstemious plan of diet, and eating everything by weight. The entire quantity of food he took daily consisted of twelve ounces of bread, eggs, &c., and fourteen ounces of liquids, making altogether only twenty-six ounces of food, solid and liquid. By following this course he recovered his health, and lived to be one hundred and four years of age. Many may suppose that the long life he attained proves the healthiness of his mode of living; it was certainly healthy for him, and might be so for any other person in a similar state of body to himself: but he must always be considered as a sort of invalid, in whom the powers of nutrition were very weak, and unable to assimilate a larger quantity of nourishment; for if he had ever required more food, he could not have borne it, as was proved by the addition of merely two ounces of solid food to his usual allowance always causing him fever, and yet a more generous diet would, undoubtedly,

have been very beneficial to him, if he could have supported it. It is by no means desirable to try and subsist upon too little food, for this practice occasionally induces a peculiar condition of the stomach, which renders it incapable of bearing the stimulus of the quantity of nourishment necessary for a vigorous state of body. In fact, in the greater number of cases of indigestion, the difficulty is to get the stomach to bear anything like a liberal allowance of food. Many dyspeptic people have an appetite, but, in consequence of the weakness of the stomach, food taken even in moderate quantities causes great uneasiness and derangement of the whole system. A common opinion prevails that indigestion is almost always brought on by over-eating: such is very frequently the case; though too much abstinence produces similar results more generally than is usually supposed. The author has frequently been consulted by persons, particularly young females, who have by degrees diminished their daily allowance of food so much, that at last their appetite becomes so

indifferent, that they are scarcely able to eat at all. These cases are very difficult to manage, and in several instances the assimilating powers of the system have been reduced to such a low ebb, that they have never recovered their tone. Unless a most rigorous discipline is regularly enforced, to compel such persons to take every day a certain portion of food, which ought to be gradually increased, nothing is to be done. The aversion of these patients for food is sometimes so great, that they have recourse to every possible contrivance to avoid being made to take it; until at last the system becomes so weakened, that other diseases, as consumption, irregularities in the circulation, &c., supervene. In one case, that of the daughter of a medical man, who had for two years lived upon a very small quantity of food, taking scarcely anything but a little bread and butter, and hardly any meat, the most serious consequences to the health were apprehended. It was therefore determined to administer to her a certain quantity of food every day, and at the regular hours for meals, in the same way that medi-

cines are given. Her father undertook this duty himself, and through his unremitting care her strength and health were with great trouble restored. The diet she was first put upon consisted chiefly of strong jelly of meat, certain portions of which she was compelled to eat every day. After the stomach had become a little accustomed to this increase of food, a part of a new-laid egg was given in the same way, then a little milk, and afterwards a small quantity of meat was allowed her. By following out this plan very carefully, she began to recover her strength, her appetite returned by degrees, and at last her health was re-established.

One great cause of people's taking too little food arises from their making, or desiring to make, an undue exertion of their intellectual powers. But the fact of their being able to support mental fatigue better when they live very abstemiously, than when they take a moderate quantity of food, is the best proof that can be adduced of the unhealthiness of such a plan of living. Whenever one organ

of the body is called upon to make undue exertion, it is done at the expense of all the other organs. Thus excessive activity of the brain requires all the powers of the system to be concentrated on that apparatus, and consequently all the other parts of the body are deprived of a great deal of their energy. In this way, when the mind is very active, the stomach is less capable of performing its functions, and the powers of nutrition of the body are debilitated. It therefore becomes necessary to give the stomach less to do, and take very little food; for if the stomach and brain also were called upon at the same time to exert themselves a great deal, the demand upon the powers of the system would be too great, neither one nor the other would perform its function properly, and most likely illness would ensue. Persons, then, who are anxious to elicit from themselves splendid intellectual manifestations do quite right for this purpose to live sparingly, and thus require little exertion from the stomach; but in doing so, they do not live in the manner most

conducive to health. Sir Isaac Newton during the time he was occupied with his work on Optics, which he considered his masterpiece, drank nothing but water, and lived very abstemiously. Napoleon, Byron, &c., have all lived sparingly when their minds were fully occupied. The professed gamester dines on boiled fowl and lemonade, to keep his head clear, without which he knows he has no chance of winning by play in the evening. Though this style of living favours great activity of the brain, it is not to be recommended. The plan to preserve the health is to live in such a manner that every part of the body may be allowed its share of activity, and not to concentrate the whole of the vital energies on any one organ in particular. It may be said that many individuals who have exhibited the greatest mental powers have been remarkable for their longevity: this is quite true, but the powers of the body vary exceedingly in different individuals. Where one person is found who can support an unwholesome plan of living,

there are thousands who fall victims to it. Examine the effects too much mental exertion produces on individuals who do not naturally possess great strength of constitution, and power of enduring intellectual fatigue. A vast majority of the men in this country who succeed in getting appointed to the great political offices of the state, find the constant call made on their mental powers too much for their strength, and therefore succumb under the fatigue they are compelled to undergo, unless they retire into private life before their health is too much undermined. They are forced to sacrifice the nutritive powers of the body to obtain sufficient activity of mind, and this of course weakens the frame, and very shortly induces disease. The time will come when people will not run so inconsiderately as at present after appointments, before they are satisfied they possess the natural strength necessary to endure the fatigues attached to them. These observations do not, however, apply solely to persons holding political appointments, but to nearly all

the middle classes in this country, more than half of whom are brought into a state of debility and disease by making greater mental exertions than their strength will allow; to do which they are compelled to live in a manner unfavourable to nutrition. They suffer too much from anxiety of mind, they frequently breathe a contaminated atmosphere, they lead too sedentary a life, and keep the body for many hours in postures which impede the circulation of the blood and the admission of air into the lungs, and very generally their food is improper both in quantity and quality. The extent to which disease might be diminished would be extraordinary, if these people would only avoid the conditions by which they are surrounded, that are most likely to act prejudicially on the health.

Having pointed out the impossibility of obtaining full vigour of system by living in too abstemious a manner, it is now necessary to describe some of the most injurious effects of an excess of food. In the former case, the

vital powers are usually too much concentrated on the nervous system, in the latter they are all directed to the stomach. The effect of over-eating generally causes excess of development of the adipose tissue, and of the organs of locomotion, by which the bulk of the body is materially increased; though sometimes great eaters, in whom assimilation is imperfectly performed, are of a very spare habit. Redundance of food is most hurtful to those persons who lead an inactive life, for when combined with violent exercise, it may be supported for some time without producing very injurious consequences, though too long a continuance of its use is always followed by disease. Prize-fighters, whilst training, subject themselves to a diet consisting chiefly of animal food broiled, which is the process of cookery that most completely prevents the escape of its nutritious juices. They live mostly on beef very much underdone, legs of fowls, and bread; they drink very little, limiting themselves to a small quantity of ale daily, because fluids favour the deposition

of adipose matter in the muscles, and prevent their acquiring solidity and hardness. Whilst adopting this routine of diet, they take a great deal of violent exercise, practise running up hills to improve their wind, lie on hard beds at night, and allow themselves but little sleep. The above plan, adhered to for a month or six weeks, greatly increases the vigour of the body, and brings it, as it is technically termed, "to the height of its condition." It is not, however, healthy, being too stimulating, and if persisted in, would invariably cause illness. Analogous plans of regimen produce similar results in animals, as game-cocks and race-horses. In these cases all the powers of the system are called into operation to favour the development of the muscular and osseous systems, which is more perfectly effected in proportion as the other organs of the body are kept in a state of inactivity. A highly nutritious diet, combined with a good deal of exercise, usually produces a plethoric state of body, rendering it liable to inflammatory attacks, affections of the heart and organs of

the circulation, and apoplexy. Without exercise, it is far more injurious, and produces still more numerous derangements of the system. All enormous eaters impose too arduous a task upon the animal functions, because excess of nutriment over-stimulates the organs of the body, in consequence of which the vital principle gradually becomes fatigued and exhausted. As long as the constitution has strength to bear this course of life, the individuals who follow it, instead of appearing to suffer from it, seem, from their fine florid appearance and fulness of form, to enjoy the most robust health. Such persons, however, are often standing as it were on the brink of a precipice, for the smallest graze or scratch of the skin is apt to produce sores which become both tedious and dangerous. The predisposition in such pampered bodies to disease is so great, that the slightest attack of inflammation of the lungs or digestive organs often resists all curative attempts and proves fatal. How many individuals are there, who are indebted to their

bad digestion for a comparatively good state of health! When such persons are thrown among the luxurious feasting which abounds in this vast city, they are compelled by the weakness of their stomachs to be abstemious, and to eat but moderately of the numerous dainties set before them; for they know, if they were once to partake profusely of them, they would certainly be ill afterwards. Such persons are often considered by their acquaintances to be poor weakly creatures, who are sure not to live long, because they cannot eat anything. These ailing people, however, manage to live longer than is expected, and they are often surprised to hear occasionally of the death of some of their most robust and healthy-looking acquaintances, who could eat anything, undergo all kinds of fatigue, and brave all weathers, without being any the worse. Indifferent health in civilized society often preserves life, while robust health is frequently the cause of death. It must not be supposed that bad health is held up here as an advantage: it is only intended to show

that a weakly constitution is often so far advantageous, inasmuch as it compels us to practise that care and self-denial so conducive to health, which we perhaps should not do if we were robust and strong. But when once persons have acquired the habit of indulging themselves in too luxurious a diet, the sudden adoption of a frugal manner of living often produces very serious consequences; and therefore any change to a more frugal plan of living, under these circumstances, should be made with care, and by degrees. An eminent metropolitan surgeon, now deceased, who was much addicted to the pleasures of the table, set out, some years ago, for Scotland, in one of the Leith packets, which sailed from the river. He experienced exceedingly bad weather during the voyage, which caused it to be prolonged so much beyond the ordinary time required for its performance, that the stock of provisions for the passengers was exhausted; on which account they were obliged to subsist for nearly three weeks on the salt junk, and

other coarse sorts of food, provided for the crew. This kind of living, so different from what he had been accustomed to, soon caused him to be very ill, and though every care was taken of him by his medical friends at Edinburgh, when he reached that city, several years elapsed before his health was completely reinstated. Excess of food probably produces effects on the body somewhat analogous to those which result from the too liberal use of wine and spirits, for if persons who have drank freely are too suddenly deprived of the artificial stimuli to which they have been long accustomed, they very frequently become ill. Extensive wounds, which in most cases are attended with so much tendency to excessive inflammation, that the use of any article of diet of an exciting nature will produce fatal results, very often will not heal in people who are habitual drunkards and bon-vivans, unless wine, spirits, or stimulating food are allowed them in rather liberal quantities. The correctness of this assertion

is very clearly shown by the following cases, recorded by the celebrated Dr. Monro of Edinburgh.

"A cook in an eating-house quarrelling with a maid servant, she struck him with a large knife, and cut through a great share of the right prima and septum of the nostrils, so that it hung down towards his lip. He had bled a long time, and was very faint by loss of blood before his nose was stitched. His wife was allowed to give him some white wine among the water-gruel he was ordered to drink, or to make some sack-whey for him. He however continued very low and faint, with sickness at the stomach and headache, for three days, till his wife told me his ordinary way of living was to drink a good deal of ale, wine, and brandy every day; and unless I would allow her to give him more and stronger liquor, she did not expect he would recover. I did not forbid her, which she interpreted into allowance, and gave a gill, or four ounces of brandy, with some of our ordinary ale.

He was much better next day, and with this dose every day, recovered daily till he was quite well."

"A man having broken the bones of his leg, after the fracture was reduced I ordered him to have no drink given him except water and milk, water-gruel, or such like. He did not sleep well in the night. Next morning I found his pulse very quick, but low, and with complaints of pain in the head, thirst, &c. Imagining some drunken companions I saw come to visit him had given him some strong liquors, I ordered him to be more strictly watched by such who I was sure would obey me, and he was kept to the low diet rigorously. He did not however seem relieved at night; slept none all night, and next morning he was altogether delirious, got out of bed, kicked away the box in which his leg had been put, his tendons were starting, and he scarce knew any person, his pulse at the same time intermitting, and being very slow. One then present, whom I knew to be a very complete drunkard of the lowest class, assured me I would

kill him if I did not allow him ale and brandy, for that the patient had for several years outdone him in irregular living. I consented to allow a little. That night he was much better, and next morning was altogether free of fever, delirium, &c., when they acknowledged he had got a Scots quart of ale and a gill of brandy the preceding day, which had made him sleep well and sound. This daily allowance of ale and brandy, then, he had all the time of his cure, which went afterwards on without the least accident."

"A distiller of wine at the West port, sitting upon the edge of the tub into which the boiling remains of a stillful of wine had been put, slid back into it, by which his hips, &c. were miserably burnt, the skin of the whole parts turning black and hard. I endeavoured to procure a suppuration by scarification, suppurating ointments, and poultices, and as his pulse was quick, ordered him to be blooded and kept on a low diet. Next day he was much dispirited, with great anxiety, and with a low, quick pulse. The third day he was

near as bad as what I mentioned the former patients to have been, when his wife insisted to be allowed to give him some of the spirits he distilled, which he got, and soon became better, the suppuration coming on in the integuments, which cured very well; his wife near the end of the cure acknowledging she had given him a mutchkin, or pound of spirits every day."

A very hearty meal may produce sudden and dangerous effects. Indigestions are frequently fatal to patients in our hospitals. All persons who have been in the habit of visiting the sick in those establishments must have occasionally observed some extensive wounds which were doing extremely well, appearing very healthy, and likely to heal, suddenly acquire a very different character, and look pale, flabby, and unhealthy, in consequence of the patients affected with them having been enabled to overload their stomachs, through the misapplied kindness of their friends, who brought them some improper food by stealth. Indigestions in such persons are sometimes

attended with much more fatal consequences, for they often cause great oppression at the stomach, after which a difficulty of breathing comes on, accompanied with pain in the side; the blood accumulates in the lungs, a rattle in the throat ensues, and the patient dies of suffocation at the end of two or three days, or in less than twenty-four hours. The author some years ago had a case of this kind, which distressed him exceedingly: it was that of a man whose leg he had amputated. The stump had almost healed, and was doing so extremely well that no one could have entertained the remotest doubt of his complete recovery. In the middle of one night, however, the unfortunate man was attacked with the kind of congestion just alluded to, which was attended with dreadful pain in the chest about the heart; and notwithstanding the almost immediate administration of the remedies most likely to be beneficial, he died early the next morning. It appeared afterwards that his friends, considering him to be nearly well, had, out of mistaken kindness, brought him the preceding

afternoon some hot roasted pork, of which he had eaten a good deal, and thus suddenly overloaded his stomach, which had been for some time unaccustomed to anything but a light and moderate regimen. The relation of this case may deter persons who unfortunately have to undergo a dangerous surgical operation from making an immoderate meal of stimulating food, which, under such circumstances, it is shown is likely to produce the most serious consequences.

Excess of food should certainly be particularly avoided, but sometimes it is difficult to determine what excess of food consists in, for what is too stimulating a diet for one constitution is not sufficiently nutritious for another. The art of preserving and restoring the vigour of the system consists in ascertaining the proper quantity and the kind of nutritious matter most suited to every instance in which the health is deranged. To say that this article of food is indigestible, and the other is digestible, is to say nothing, for almost all sorts of food are digestible when eaten in

moderation by persons in health; and to prohibit the use of a large class of articles of diet is to limit the variety of alimentary matter, which always ought to be avoided as much as possible, for nothing favours the development of the body more, and enables it to be performed with less fatigue of the vital powers, than varying the food from day to day. People who are robust should avoid eating too frequently; others in whom the appetite is bad, and the constitution is weakly, should embrace all proper opportunities of supplying the system with nutritious matter. The propriety of this plan has often been manifest to the author in different families consisting of several children, many of whom can assimilate anything they eat, and always enjoy good health, whilst some of their brothers or sisters, who are supplied with precisely the same food, are weak, sickly, and have little power of causing nutrition to be effected. Nothing will more strongly illustrate this point than the following history of the case of a little girl, who was for some time under the author's care,

and it is only the type of many others which have come under his notice. A young girl about six years of age had from infancy been a weakly child, was of a highly nervous temperament, tall for her age, and of slim, delicate make. She was extremely excitable, slept badly, had too much muscular activity for her strength, in consequence of which she seldom remained quiet; a delicate appetite, scanty secretions, particularly of the perspiratory fluids; was generally troubled with a slight cough in the winter, her pulse was rapid, skin hot and exceedingly dry, being covered with a sort of scurf on those parts of the body defended by the clothing from the air, but on the hands and face presenting a cracked appearance like chaps. This child's complaint had been considered to result from indigestion, and therefore she had been allowed only a very small quantity of the plainest food, and no stimulants. With this treatment her symptoms became aggravated, when she was placed under the author's care. A complete alteration was now made in her way of living, for

she was allowed as generous a diet as she could bear. She had an egg, meat, or milk with bread for breakfast; sago, arrow-root, or jelly for luncheon; meat for dinner, particularly fowls, rabbits, and light viands of that description; arrow-root or sago with milk for supper. At dinner she drank bitter ale, and occasionally a little port wine. In two months after the adoption of this plan her health had considerably improved, she was less irritable, slept better, had gained strength, her appetite was improved, and when the warm weather commenced, for the first time since she was born, a slight moisture was perceptible on the skin, which gradually lost its chapped appearance, and at the end of the following summer became quite smooth and soft. Since then, by persisting in a generous diet, her health has become completely established. This was one of those cases which require as much food as possible to be given, always taking care the quantity shall not be so great as to cause indigestion, and is a striking instance of the advantages a liberal diet can produce when

given with discretion. It would be exceedingly improper to treat all children in this manner, as clearly appeared in the instance of the younger sister of the child whose case has just been detailed, and who enjoyed a constitution of quite an opposite description. Instead of requiring stimulating food, the plainest diet was most favourable to her health. If ever she partook of any concentrated kinds of food she became indisposed; beer and wine always made her ill, and therefore she drank nothing but water. As long as she was confined to very simple food, and took her meals at rather long intervals, she enjoyed perfect health. Attention to diet will not only cure many disorders, but very frequently gives us the power of preventing the occurrence of disease at all. Experience has proved that laws to prevent crime are more likely to suppress its commission than the severest punishment of it. The same reasoning holds good with disease. It is far better that disease should be prevented than that it should be cured; in fact the occurrence of disease only proves the de-

fect of the means which have been employed for preserving the health. No disease can be cured without injury to the health, for the remedies employed for this purpose always cause some excessive and unnatural action in the body, which lessens its power. If people would endeavour to ascertain how they may keep themselves free from disease—a kind of knowledge, judging from their conduct, they seem to be lamentably deficient in—they might very frequently escape even the pain and anxiety attending complaints that are ultimately cured. Benevolent individuals have earned the gratitude of thousands by founding hospitals, which confer the most important benefits on the sick. At the same time philanthropists do not seem to be aware that they would secure the poor much greater immunity from disease if, instead of establishing hospitals only, they were also to found charities for the purpose of affording the humblest classes of society the means of obtaining occasional relaxation and absence from many of their occupations, which, when persisted in continually,

almost inevitably, from their unhealthy nature, bring on illness. Let extensive plans be tried to prevent disease, and they will be found infinitely more advantageous than all which are at present adopted with a view to cure it. It is hoped these ideas may attract the attention of the benevolent, and that some attempt will be made ere long to set on foot arrangements for carrying them out. People would preserve their health much better, and live longer, if they would avoid the numerous causes likely to produce illness by which most of them are surrounded, instead of persisting, as at present, in living in a way which is very unhealthy until disease has made great inroads into their constitutions, and then making every exertion to get themselves cured. Whatever the wealthier classes may do, some time must elapse before any direct system will be adopted for endeavouring to prevent disease among the poor. But certainly it is much to be regretted that the governors of the principal hospitals in London, some of which possess endowments producing incomes of upwards of 50,000*l.* per

annum, do not provide a place of residence for the patients in the country, during their convalescence, instead of keeping them shut up, as at present, in the close air of an hospital in town. To guard those who are beginning to recover, after a severe illness, from the chance of a relapse, by securing to them the advantages of country air, must surely come quite within the scope of the intentions of the founders of those princely establishments, and the managers of them only do half their duty while they neglect to provide for so important an object.

The heads of families who make a point of contributing handsomely to public medical charities, under the idea that their servants, and the poor in whom they take an interest, will be able when ill to procure the best medical and surgical assistance from the officers of those establishments, would do more good by expending their money in a manner to secure such persons the means of desisting occasionally from their ordinary labours, and to remove from them as much as possible all

external circumstances likely to be prejudicial to the health. People have constantly exhausted their ingenuity to devise plans for curing disease, without endeavouring to ascertain how its occurrence can be prevented; and this in the face of the fact, that prophylactic remedies have conferred more striking and extended benefits on the human race than any others. The discovery of vaccination has saved, and will save, millions and millions from an untimely grave, though the most approved treatment of small-pox can boast of no such results; and could preventives be found for a few other equally serious disorders, the maladies the human race is liable to would be diminished to quite an unexpected extent. A great many illnesses might be avoided altogether if people would only make a few sacrifices, and live in a manner a little more conducive to health than they do at present. Comparatively speaking, scarcely anything has been done with the view of guarding against disease. Latterly public attention has been a little directed to a few circumstances in Lon-

don, which are likely to be prejudicial to the health. The cholera in this respect has been of some advantage, for it has led to inquiries into the state of many of the worst-drained and worst-ventilated parts of the metropolis where fevers almost constantly prevail. Persons residing near a neighbourhood where malignant fevers are continually raging, though not attacked by them, are still living under circumstances very likely to produce illness, and are therefore nearly as much interested in the removal of the causes of those fevers as the individuals who are the victims of them. The practice of burying the dead in cities cannot be too strongly reprehended. The formation of cemeteries without the town has begun to remedy this evil, but very imperfectly; for though the rich are interred in them, the poor, and therefore the more numerous class, from motives of economy in most parishes, are still buried in the old burial-grounds within the city. The legislature ought to compel each union either to procure a burial-ground for the poor in the suburbs, or contract with some

company to provide one; for until that is done the inhabitants of all large cities, and particularly London, must continue to suffer from the bad effects produced by the exhalation of miasmal vapours constantly given out from the remains of the dead, which in some instances are not covered with a layer of earth a foot thick. If care were taken to remove the most obvious causes of disease in London, which could easily be done without either much trouble or expense, it might be rendered nearly as healthy as the country, if not quite as much so. The sewers, though still very imperfect, give the drainage upon the whole a degree of perfection not to be met with elsewhere; and by carrying off the superfluous water, prevent the decomposition of vegetable and animal substances, which is always so much favoured by moisture. In this manner one principal cause of the generation of unwholesome miasma is almost completely obviated; and if new streets were opened, many old ones widened, new parks formed, and the

manufacturers were compelled by law to consume the smoke of their factories, which they ought to be made to do, the salubrity of London would be improved to an extraordinary extent.

It generally happens that all things whose nature is unknown are supposed to possess much more extraordinary powers than can possibly belong to them. This is the case with the vital principle, which produces such inexplicable and extraordinary effects, that most persons imagine it is hardly influenced by external circumstances; and that life will continue, and nutrition will be effected, under the most unfavourable conditions. For this reason people seldom inquire whether they are surrounded or not by causes likely to produce indisposition until they get ill; for a common opinion prevails that a good constitution will bear anything: but the physician knows that nothing is so easy as to ruin a fine constitution, even when what is called common care is taken of the health. Remarks

are frequently made that the London tradespeople, who go so often to the sea-coast by steam-boats, or make short journeys into the country by the rail-roads, must sadly neglect their affairs by being absent so much from their shops. All this is probably very true; but it is equally certain that many a man preserves his health by these excursions; and though he may lose a little by them at the time, the change of air and intermission from mental exertion they afford him, often invigorate his constitution in such a manner, that with a few such periodical relaxations every two or three months, he can go on attending to his business for years without being attacked with illness; whereas if he were to continue shut up in his counting-house unremittingly in the close atmosphere of London all the year round, he would run the risk of being laid up at the end of that period with some serious complaint, which he might never get rid of. Instead, then, of deprecating such expeditions, they ought, if possible, to be made more fre-

quently than they are; for it is much better economy to spend a little money in preserving the health, than to accumulate it for the purpose of paying for medicines to cure disease.

NUTRITION.

A detailed account having been given of the nature and effects of the substances subservient to the development of the body, that are introduced into it through the organs of digestion, it will now be proper to offer some observations on the manner in which nutrition is effected. Alimentary matter by itself has no power of effecting the growth of the body, and can only be rendered fit for this purpose by subjection to the process of digestion. To enter into an account of that function would be foreign to the object of the present work; and therefore it will be sufficient to mention that during the time that the food remains in the stomach and intestinal tube, it undergoes a variety of changes produced by the influence of the contact, and of the secretions of the

glands of those organs, the result of which is to cause the separation of the nutritious part of the food from that which is not nutritious. After this separation has taken place, the nutritious portions of the alimentary mass, as the chyle, &c., are admitted into the organs of the circulation in the following manner. The lacteals convey the chyle from the intestines up to the left shoulder, and pour it into the interior of the left subclavian vein, from which it soon flows down to the heart. The veins of the intestinal canal receive by their extremities, which open into that tube, several salts, and many substances possessing odoriferous properties, contained in the food: these are then carried up to the liver, through which they are first made to pass and afterwards transmitted to the heart. In this way, after each successive introduction of food into the body, a fresh addition of matter is made to the blood; for which reason this fluid is able to furnish the substances necessary for the growth and development of the different organs. When the great variety of the physical characters

presented by the numerous tissues is considered, it is obvious that any fluid capable of affording materials for the formation and nourishment of all of them must be of a very compound nature. For some parts of the body are harder than the densest marble, as the enamel of the teeth; others are perfectly transparent, like the purest crystal, as the humours of the eye; many are quite colourless, and have no contractility, as the tendons and ligaments; whilst others, as the muscles, are of a deep red hue, and possess such powerful contractile powers, that though of inconsiderable size themselves, they can exert a force equal to many hundred pounds in weight; a few, as the hair and nails, are so insensible that they may be divided without our perceiving it; and lastly, some parts of the brain and nervous system are so exquisitely sensitive, that the slightest pressure upon them suffices to produce the immediate death of the individual. Chemical analysis shows that the different parts of the body contain the following fifteen elementary substances:—

1. Oxygen
2. Hydrogen
3. Carbon
4. Nitrogen
5. Sulphur — met with principally in the hair, albumen, and brain.
6. Phosphorus — met with principally in the bones, teeth, and brain.
7. Chlorine
8. Fluor
9. Potassium
10. Sodium
11. Calcium
12. Magnesium

(7–12) met with principally in the teeth and bones.

13. Manganese
14. Silicium

(13, 14) found in the hair.

15. Iron — found in the blood, pigmentum nigrum, and crystalline lens.

According to the subjoined analysis by Le Cann, all the above elements are found in the blood, with the exception of one or two, but these most probably also exist in it; and their not having been yet detected is rather to be referred to the present imperfect state of chemical science than to their being actually wanting.

Composition of the Blood, according to Le Cann.

Water	786·500
Albumen	69·415
Fibrin	3·565
Colouring matter	119·626
Crystallizable fatty matter	4·300
Oily matter	2·270
Extractive matter soluble in alcohol	1·920
Albumen combined with soda	2·010
Chloruret of sodium and potassium, alkaline phosphates, sulphates, and carbonates	7·304
Subcarbonate of lime and magnesia, phosphates of lime, magnesia, and iron, peroxide of iron	1·414
Loss	2·586
	1000

The above table shows, that, besides the greater number of the elementary substances composing the body, the blood also contains several of the proximate principles of the different tissues: as albumen, which is the basis of membrane; fibrin, the basis of muscle; and fatty matter, the basis of nerve and brain. The blood, independently of being such a remarkably compound fluid, possesses other properties

which render it admirably fitted for the purposes of nutrition. As long as it is kept in a state of motion, it preserves its liquidity; but if allowed to remain for a short time in a state of repose, it divides into two portions, one possessing considerable solidity called the coagulum, and another of a fluid nature called the serum. This separation is most commonly seen in blood which has been extracted from the arm, and allowed to remain in a state of rest; but when blood is stirred for some time after it has been drawn, it retains its fluid state. Several diseases also deprive the blood of its power of coagulation. Many unprofessional persons imagine the coagulation of the blood occurs out of the body only, but this is not the case, for it coagulates both in the body and out of it, if kept free from motion. The surgeon avails himself of this property to produce obliteration of the canals in blood-vessels, as in cases of aneurism, a disease which consists in the gradual bursting of the coats of an artery. A ligature, in these cases, is applied round the vessel affected, which of course pre-

vents the blood flowing through it. The blood close to the ligature now remaining in a state of rest coagulates; the fluid part or serum is absorbed, whilst the solid coagulum left in the vessel constitutes a natural plug, which fills up the passage through it. In a short time blood-vessels make their appearance in this coagulum, connect it to the coats of the artery, and gradually change it into a part of the living body. In this way the hollow artery is converted into a solid cord, the passage through it being completely obliterated. The facility with which the solid part of the blood is separated, under these circumstances, from the liquid, and made to become part of the body itself, shows how admirably this fluid is adapted for nutrition. Some microscopists maintain that during the time coagulation is going on, the globules in the blood may be seen arranging themselves with singular regularity in linear series, which may likewise be of great aid to the nutritive process. That the blood is the source from which the organs of the body procure the elements of which they are composed is quite cer-

tain ; but how it happens that each part, having such a compound fluid presented to it in a mass, should be able to select those elements exclusively which are necessary for its own development, and permit them alone to pass into, and be deposited in, its substance or parenchyma, whilst all the others are prevented from doing so, is still a mystery. Though the laws by which this wonderful process is regulated are unknown, the following conditions are necessary for its being effected. Each of the more complicated organs in the higher animals is furnished with an artery, a vein, an absorbent, and a nerve. The artery carries arterial blood to the part, to supply it with fresh matter ; but the quantity of blood is more than is actually requisite, which renders it necessary the superfluity should be got rid of. This is effected by the vein which receives the refuse of the arterial blood, and carries it back again to the heart, after it has circulated through the organ, to which it was brought by the artery. Nutrition, however, is not performed merely by an addition of fresh matter

to an organ, but, generally speaking, a continual change is going on in it, the old particles of which it is composed being removed, and fresh ones being deposited in their place. The carrying away the old particles is assigned to vessels called absorbents, which are found in a great many organs, though in some parts none of these vessels are apparent, and then the removal of the old particles is effected by the veins. It has been mentioned that, besides an artery, a vein, and an absorbent being necessary for nutrition, a nerve is likewise requisite. The probable use of the nerve is to regulate the entrance of the different elements of the blood into the substance of the organ; so that those only which are proper for its development shall be allowed to pass into its intimate structure. This supposed regulating power of the nerve partly explains how each organ is enabled to select from the blood those elements only which are proper for its particular composition. But, besides the influence of the nerve, the difference in the mechanical arrangement of the fibres and membranes be-

longing to the several tissues is another principal cause that some of the materials in the blood find their way into the most intricate portions of an organ, whilst others cannot pass into them. The existence of this difference is clearly proved by the results of the following experiments. When the arteries of the human body are injected with a solution of gelatine coloured with vermilion, the gelatine is often seen deposited without any colouring matter, round and between the convolutions of the brain; whilst on both surfaces of the choroid membrane it will be found to have exuded in the same state as when injected into the body. This shows that the fibres of the cerebral mass must be arranged in meshes of a very different description to those of the choroid membrane; for whilst the former allow the gelatine only to flow through them, the latter permit the gelatine and vermilion to pass both together. Again, if linseed oil coloured with vermilion be used as an injection, the oil without any vermilion is often found in the great synovial capsules of the articulations, but it has not

been seen to transude on the surface of the brain. Thus, though it was natural to expect that oil would pass where gelatine could, it does not do so; and further, though oil in these cases has been found in the articulations, no gelatine has been met with there when used as an injection instead of oil. The various parts of the body may be compared to sieves with apertures of different sizes and forms, which will only allow particles of matter of corresponding dimensions and shapes to pass through them. In membranous parts the transmission of fluids is greatly influenced by their densities, which must be of the greatest consequence in nutrition; since the cellular substance of which the membranes are chiefly composed pervades almost every part of the body, and constitutes one of the readiest means of communication between the different organs. To give unprofessional persons a correct notion of the physical character of the tissue denominated cellular substance, they must be referred to the appearance it presents in veal which has been inflated by the butcher to make it have a plump ap-

pearance. It is seen collected in greatest abundance between the muscles and near the inflections of the large joints, in the form of a number of cells composed of layers of a delicate shining, silver membrane. These cells communicate freely one with another, so that by forcing air into one of them, the whole of the cellular substance of the body may be inflated. In the human body, in cases of fracture of the ribs, which sometimes, by the protrusion of the sharp ends of the broken bones, causes a communication to be established between the interior of the lungs and the internal surface of the skin covering the chest, part of the air drawn into the lungs during respiration finds its way from the interior of the chest into the cellular substance under the skin which covers it, and passes rapidly from cell to cell till the whole body becomes inflated, presenting a most frightful and alarming appearance to those who are ignorant of the cause of it. In the same way the whole body often becomes œdematous in dropsy, on account of the facility with which

the effused fluid flows from cell to cell in the cellular substance.

Though the great freedom of communication between the cavities belonging to the cellular membrane allows substances of a gaseous or aqueous nature to be rapidly disseminated throughout the body, the peculiar manner in which this tissue is arranged permits them to pass only in certain directions; which is of the greatest consequence to the health, for by this means the isolation of many of the most important viscera is effected. To explain more fully how this happens, it is necessary to state that the cellular substance surrounds the muscles, tendons, arteries, veins, and nerves, with sheaths or cases, and therefore any fluid which finds its way into one of these sheaths is obliged to move in the direction they take; and is thus prevented from being indiscriminately diffused throughout the intimate structure of the neighbouring organs, though it may pass through all the intricacies of the cellular membrane itself. The surgeon, from a knowledge of this

fact, is able to predicate, when abscesses form in the body, at what part of the surface the matter they contain will present itself; because he is aware it will gradually insinuate itself from the spot where it is first collected down those sheaths of the cellular membrane which are nearest to it, and into which it tends to be impelled by its own gravity. For instance, in what is called psoas or lumbar abscess, the matter is first effused in the loins; but, on account of the upright position of the body, it runs down the cellular sheaths of the tendons of the psoæ muscles, till it meets with the cavity between the muscles at the upper part of the thigh, where it makes a lodgment, and soon becomes apparent through the skin. In this way the matter formed in the loins is prevented from being diffused among the viscera in the abdomen and pelvis, by being conveyed along the canals of the cellular membrane past them all, to the upper part of the lower extremity; and this shows that though the cellular substance allows of a very general communication between the remotest parts of the body, it

sometimes has the effect of isolating a great many organs, and thus preserving them from injury. Many solid cylindrical bodies also, as needles, pins, fish-bones, &c., often travel through the cellular substance from one part of the human frame to the other without causing any inconvenience.

About two years ago, a lady who was under the author's professional care complained to him of a small swelling she had just observed about the middle of the breast-bone. Upon examination it presented the appearance of a large pimple with a minute black spot in the centre; by gentle pressure a point like a thorn was made to protrude, which was easily grasped with a pair of forceps, and on being drawn out proved to belong to a needle much rusted. Upon inquiring how a needle came to get into this part of the body, the patient at first could not account for it; but she shortly recollected that about three months before, when she was one day coming downstairs with some needles in her hand, she fell down. Most likely at that time one of them was forced, though she did

not feel it, into the arm or some other part of the body, whence it gradually travelled between the meshes of the cellular substance to the chest, where some accidental cause must have altered its course, and directed it to that part of the surface of the skin at which it was detected. Needles and pins that are accidentally swallowed often pass from one end of the body to the other without causing any inconvenience, for they seldom get into any of the important viscera, but travel through the small cavities in the cellular membrane, like the grass-creepers schoolboys amuse themselves with, which, when placed between the layers of clothing on the arm, gradually work themselves up from the wrist to the shoulder.

The cellular substance, besides establishing such a general communication throughout the system, exercises a most important influence over nutrition, on account of being the chief component of the membranes. The phenomena attending the infiltration of fluids through membrane, first pointed out by Dutrochet, are extremely interesting, and must materially af-

fect the deposition in the different organs of the particular elementary substances of which they are composed. A piece of membrane, viewed under the highest power of the microscope, appears to have a perfectly homogeneous texture, without pores of any kind; and yet, under certain conditions, water, milk, and other fluids, will pass through it without difficulty. When two fluids of different densities, having a mutual affinity for one another, are placed on the opposite sides of a piece of membrane, each will pass through it, and they will become intermixed. If a bladder containing a little treacle be immersed in water, a portion of the treacle will soon exude from the bladder, and a greater quantity of water will penetrate it, which processes will continue until the treacle and the water have acquired the same density. The lighter fluid, however, passes with greater velocity than the denser one through the bladder, which consequently becomes gradually distended. Dutrochet, after he had discovered this singular property in membrane, constructed an apparatus called an endosmometer, by

which he ascertained that the passage, or the endosmose, as he has termed it, of water into a bladder containing a syrup three times its density, takes place with a force capable of supporting the weight of three atmospheres. This power, possessed by membranes, of causing fluids to pass through them, must be of great importance to nutrition, and frequently be the cause why different substances find their way into the capillaries and become mixed with the blood.

The endosmosis of gases is also very interesting. M. Faust, who has made many experiments on this subject, states that a bladder half filled with atmospheric air, placed under a jar containing carbonic acid gas, soon becomes distended by the carbonic acid which penetrates it; and if the bladder which is placed in the carbonic acid contain hydrogen, it becomes distended to bursting. On the other hand, when the jar contains the lighter and the bladder the heavier gas, the bladder becomes collapsed. Different kinds of gases placed in contact with the two surfaces of a wet

bladder, permeate it and become mixed together; and a gas placed externally to a moist bladder containing a fluid, will penetrate it and be absorbed by the fluid within. This explains how the atmospheric air which is introduced into the lungs during respiration can pass into the blood, though at the same time none of that fluid is able to escape. To avoid the possibility of the account just given of endosmosis leading to a conclusion that fluids of different densities always become intermixed when brought into contact with the opposite surfaces of membranes in living beings, it will be proper to state that this does not appear to be the case. When the human body is alive no exudation takes place from the surface of the gall-bladder, but if this sac be examined a few hours after death, the bile will be found to have passed through it, and stained all the surrounding viscera. Indeed, if endosmosis were always to occur through membranous parts in living beings, it would be productive of the most serious consequences. In poisonous animals the venom, to be ready for use, is

collected in considerable quantities in membranous sacs, where it lies innocuous to the animal itself. But this is only the case as long as it is confined to its natural reservoir, for, if any of it were to filter through the sides of the poison-bag, the animal to bite itself, or be artificially inoculated with its own venom, death would ensue. Nutrition is no doubt assisted by endosmosis; but it is clear vitality greatly modifies, and sometimes altogether interrupts, this property belonging to membrane.

Though nearly all the elements of the different apparatus composing the body are found in the blood, yet on looking over the analysis of that fluid it will be seen to contain a great many substances, as iron, sulphur, phosphorus, &c., which are not ordinarily supposed to possess nutritious properties, or considered to be used as articles of food. Some parts of the body also contain manganese. But these substances are eaten in large quantities in combination with other matter. Iron is found in almost all vegetables; it abounds particularly in indigo, assafœtida, olives, asparagus, garlic,

and the grain and straw of the gramineæ, and consequently is continually being introduced into the body with some of the most ordinary articles of diet; so there is no difficulty in accounting for the presence of the great quantity of iron found in the blood, pigmentum nigrum, and crystalline lens. Phosphorus, which enters so largely into the composition of the bones, teeth, and brain, is found in corn, chestnuts, onions, &c. Sulphur, met with in the hair, in albumen, in the brain, and nervous tissue in general, constituting a large proportion of the cerebral matter, exists in an acid state in orange-flowers, celery, hops, ginger, rice, assafœtida, &c., and in a pure state in the crucifera, particularly in mustard-seeds. Manganese has been discovered in considerable quantities in the vine, in figs, and in the grain and straw of wheat, which explains the source whence this metal, which is one of the chief elements of the hair, is procured. Most of the metals, with the exception of copper, and the other simple substances found in different kinds of vegetables used as food, have been ascer-

tained to exist also in the organs of the body. It is very singular no copper has ever been detected in them; and therefore it is difficult to understand what can become of it, for very considerable quantities of this metal are introduced into the body: it is very abundant in coffee, bark, corn, &c.

M. Sarzeau calculates the coffee consumed annually by the French people contains 1400lbs. weight of copper, and the corn eaten by them 9125lbs. weight; making the total quantity of copper taken by the inhabitants of France every year in their food amount to 10,525lbs. weight. All the elements of the different organs of the body are to be found in the food, and the process of nutrition apparently consists in separating them from the blood, modifying them, and depositing them respectively in those tissues of which they are found to be the component substances. The most generally received opinion among physiologists is that no actual alteration of the elements of the food takes place; that is to say, no conversion of simple substances from one into another ever occurs. The mass of

evidence is unquestionably favourable to this doctrine, though at the same time the effects of the nutritive process are so wonderful, that, independently of a few elements, as the fluor, calcium of the teeth, &c., and some compound substances, as the picromel of the bile, and the salivary matter, not having been yet discovered in the blood, there are other facts which almost warrant the suspicion that the nutritive power may exert a more extended influence on the nature of the elements of the food than is usually admitted.

The egg of a bird presents an example of a circumscribed quantity of nutritious matter, to which no fresh addition can be made during the period of incubation; and yet the influences merely of an elevated temperature, of atmospheric air, and of the vital principle, cause the most extraordinary changes to take place in it. The development of the yolk and white presents some of the most remarkable phenomena manifested by the animated creation. Though both semi-fluid substances, apparently very simple in their nature, they are gradually

metamorphosed into a living being, provided with blood-vessels, nerves, muscles, tendons, cartilages, ligaments, membranes, bones, &c. The yellow yolk and the transparent colourless albumen are changed into blood and muscles which are red, into the liver which is brown, into gall which is green, into white and opaque nervous matter, into the horny beak and claws, into feathers offering every variety of hue, and into the hard and solid bones. The formation of the bones of the chick is the most difficult of explanation, for the quantity of solid matter they contain is much greater than that which exists in the yolk and white. It has been generally supposed that the greater portion of the earths and salts composing the bones of the chick is procured from the shell; but according to Dr. Prout, the weight of the shell is as great after incubation as it was before it. Now, if it be the fact that the earths and salts of the bones are not obtained from the shell, it is impossible to account for their presence without admitting that, under certain circumstances, simple substances, or rather substances sup-

posed to be simple, may be converted one into another by vital action, which is not at all likely: but this subject is so intricate, and at present so little understood, that no satisfactory conclusion upon it can be come to before it has been further investigated. At the same time, in all attempts to determine the exact influence of the nutritive process on the elements composing organized beings, the remarkable effects produced by it ought to be kept constantly in view.

Observe what occurs in the higher orders of living beings during the reproduction or restoration of parts which have been injured or partially destroyed. When a bone in the human body is fractured, the divided ends pour forth a quantity of new osseous matter, called "callus," which, though of a soft cartilaginous nature at first, gradually becomes hard, and unites the broken pieces together. In watching the course of this beautiful process for repairing injuries to the solid scaffolding of the body, it is difficult to account for the sudden accumulation of bony substance which takes

place. The same kind of food is introduced into the body after as before the fracture, with this difference only, that after such an accident the diet is generally restricted, and stimulating articles of food are usually prohibited, to guard against the occurrence of inflammation. The composition of the blood therefore cannot be in any way altered, and yet, merely on account of the irritation caused by the fracture, the production of an increased quantity of osseous substance in the system is seen to occur. It would be different if experience had shown that the healing of the bones was facilitated by food consisting of osseous matter, but this is not the case; the eating of bone does not afford any aid to the union of fractures whatever. Again, when the skin or parts of muscles are destroyed by extensive burns, the reproduction and healing of these tissues is not facilitated by a diet consisting principally of skin or muscle, though it is quite evident an increased accumulation of these substances is effected in the body after they have been injured or partially destroyed.

These results at all events show that the nutritive process can, under peculiar circumstances, cause the deposition of the elements of the different organs to be greatly augmented; and to such an extent is this carried in some of the inferior animals, that whole apparatus which have been removed are entirely reproduced, as the claws of lobsters, the tails of lizards, &c.

Food was defined at the commencement of this work to consist of all the ingesta taken into the body. The substances introduced in greatest abundance into the system are the gases forming atmospheric air: for it is calculated that, on the average, each individual introduces every four-and-twenty hours into his chest, for the performance of respiration, more than seventy hogsheads of air, and any interruption to its free admission into the lungs for more than two or three minutes causes a suspension of the vital powers. A considerable quantity of air is likewise admitted into the body through the skin. The colour of the blue venous blood, by being brought into contact with the air in the lungs,

is changed to a bright red. Hering calculates that the circulation of the blood throughout the body is completed once in about every two minutes, from which it follows that during the twenty-four hours the blood is changed from blue to red more than seven hundred and twenty times. This alteration in colour is merely the index that air has been brought into contact with the blood, but affords no explanation of its use to the animal economy. Air being introduced in such a continued manner to the circulating fluid in all living beings must be considered one of the great ingesta into the body, analogous to the essences of the food, which, it has already been shown, are conveyed in different ways from the digestive apparatus into the blood. Respiration, and the absorption of air by the skin, independently of the assistance they may afford to the production of animal heat, are the functions by which the gases entering into the composition of the different tissues of the body are admitted into the blood, and therefore are distinct means by which fresh

materials are added to the system. Whether animals obtain any solid matter through respiration has not yet been actually ascertained, but probably they do so in very small quantities; for Ehrenberg has proved that the atmosphere is often loaded with myriads of animalculæ, which are continually raised into it with the vapours exhaled from the different collections of water on the earth. These minute creatures are wafted by the winds from one quarter of the globe to another, and therefore great numbers of them must be constantly introduced into the lungs in respiration. What their influence is, if they have any, on nutrition, is not known. There is a difficulty in admitting that any materials can be derived from the air for the growth of the body, because its weight is not perceptibly increased by respiration, though this is removed when the extreme lightness of oxygen and nitrogen is considered, which are the gases absorbed by the blood whilst in the lungs. Carbonic acid, the only gas in atmospheric air which has much weight, is

always exhaled during the respiration of animals. It is, however, quite certain that some living beings do obtain solid matter for their development from the atmosphere. Many vegetables procure from it a much greater part of the materials of which they are composed than from any other source. When plants are exposed to the influence of light, the carbonic acid introduced into their leaves, which are in fact their lungs, is decomposed; the oxygen which it contains being evolved, whilst the carbon is retained and made to become part and parcel of the plant itself. This fact explains several curious phenomena connected with the development of plants. Many vegetables grow, though supplied with scarcely anything but air and moisture. Van Helmont states, he planted a willow in an earthen pot full of earth, and that in five years the weight of the willow had increased 150 lbs., whilst the weight of the earth had scarcely diminished, so that the greater portion of the elements composing the willow must have been obtained from some other

source than the soil in which it was planted. Vegetables have been found to grow in almost anything, as plaster, pure sand, saw-dust, cotton, tan, &c., though the most sterile matters produce the smallest plants. The aloe, during the two or three months preceding its inflorescence, gives forth a stem for its flowers which attains a length of sixteen or eighteen feet. Ventenat mentions that an Agave fœtida which he watched grew twenty-two feet and a half in length between the 9th of August and the 25th of October, a period of seventy-seven days, which was at the rate of more than three inches a day. Some of those singular vegetables to which the name Phallus has been given grow three, four, or five inches in less than half an hour. The Bovista giganteum, a species of fungus, acquires the size of a large gourd in one night. It is composed of cells united together by fibres. Each cell is said to measure about $\frac{1}{200}$th part of an inch in diameter, so that one of these plants of ordinary size must contain about 48,000,000,000 of cells, and, supposing twelve

hours to have been necessary for its growth, the cells in it must have been produced at the rate of 4,000,000,000 an hour, or more than 66,000,000 a minute. The whole of this vast accession of fresh matter, particularly when it is recollected how much carbon plants contain, can hardly have been obtained in so short a time from the earth, but the greater part is most likely derived from the atmosphere. The proof that plants obtain materials for their development from the air is most strikingly afforded by those which continue to grow, though not in contact with the earth at all. The Protococcus nivalis, or red snow, vegetates upon eternal snows, which, on account of their thickness, render it impossible for this plant to obtain any nutritious matter from the earth, and therefore it can only derive the elements of which it is composed either from the snow on which it is found, or from the surrounding atmosphere.* The Epidendrum aërides, or

* It is proper to mention that, lately, the globules of

air-plant, of South America, is still more dependent on air for the materials of which it is composed. This singular vegetable grows and flowers when suspended by a string to the ceiling of a room, and the South Americans hang it about the apartments of their houses as an ornament. To show how perfectly it is independent of any soil for its growth, Sir Woodbine Parish mentions that the windows of the houses in Buenos Ayres are generally furnished with large iron gratings, to protect the inhabitants from infractions of the mobs during the frequent civil commotions which occur in that city; and that these air-plants may be seen growing and flowering on the iron bars of these gratings with the greatest luxuriance. It is impossible they can obtain any nourishment from the iron to which they are attached, so they must procure it from the air.

Living beings, then, obtain the elements

the red snow have been considered by some naturalists to be the ova of a species of rotifer.

composing their bodies from substances which pass into the circulating fluid, from the organs of digestion, and from the organs of respiration. The healthy development of the system, therefore, is dependent upon the nature of those substances; which shows that, in order to preserve the health, it is not only necessary to take care and procure alimentary substances of a good quality and wholesome description, but it is also requisite that an ample supply of pure air should be obtained likewise.

FINIS.

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